

**2006 Annual Water Quality Report  
& Leachate Control System Performance  
AWG 7/60 Evaluation  
CPL Council Bluffs C & D Landfill  
Council Bluffs, Iowa  
Permit No. 78-SDP-04-89P  
Project No. ANDEX 06001**

1801 Industrial Circle, West Des Moines, Iowa 50265  
(515) 256-8814 Fax (515) 256-0152

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**BARKER LEMAR**  
ENGINEERING CONSULTANTS

November 30, 2006

Ms. Amie Hart  
Iowa Department of Natural Resources  
Energy and Waste Management Bureau  
Wallace State Office Building  
502 East 9<sup>th</sup> Street  
Des Moines, IA 50319-0034

**RE: 2006 Annual Water Quality Report and  
Leachate Control System Performance Evaluation  
Council Bluffs C&D Landfill  
Permit No. 78-SDP-04-89P  
Project No. ANDEX 06001**

Dear Amie:

**BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR)** has completed the water quality monitoring and assessment for the above-referenced site for the year 2006. Our services were performed in general accordance with Iowa Administrative Code (IAC) Section 114.26(4) and the current requirements for implementation of the Hydrologic Monitoring System Plan (HMS). Please find enclosed a copy of the 2006 Annual Water Quality Report and Leachate Control System Performance Evaluation for the above-referenced site.

If you have any questions regarding this report, please contact us at (515) 256-8814.

Sincerely,  
**BARKER LEMAR ENGINEERING CONSULTANTS**

  
Yuta Naganuma, E.I.  
Staff Engineer

  
Christine L. Collier, P.E.  
Senior Project Manager

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copies: Addressee  
Mr. Virgil Anderson, Anderson Excavating Company  
IDNR Field Office # 4  
File

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**BARKER LEMAR**  
ENGINEERING CONSULTANTS

**2006 ANNUAL WATER QUALITY REPORT &  
LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION  
COUNCIL BLUFFS C & D LANDFILL  
COUNCIL BLUFFS, IOWA**

**PERMIT No. 78-SDP-04-89P  
PROJECT No. ANDEX 06001  
NOVEMBER 2006**



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

*Christine L. Collier*  
Christine L. Collier, P.E.

Date: 11/30/06

License No. 17963

My license renewal date is December 31, 2007

Pages or sheets covered by this seal:

*All*

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## **1.0 INTRODUCTION**

**BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR)**, on behalf of our client, Anderson Excavating Company, has completed the required groundwater sampling at the Council Bluffs C&D Landfill. This report is prepared in general accordance with the requirements of Iowa Administrative Code (IAC) Section 114(455B) and additional IDNR requirements. This report summarizes the 2006 site groundwater monitoring program and provides analysis of the data collected.

### **1.1 BRIEF HISTORY OF THE SITE**

The Anderson Excavating C&D Sanitary Landfill is situated within an old pit, which was abandoned in the 1950's after a failed attempt to obtain sand and gravel. The landfill has been a permitted facility since 1989. The site has actively been receiving waste since that time. The landfill property covers approximately 80 acres, of which approximately 1.9 acres are currently permitted for solid waste disposal.

### **1.2 GEOLOGY OF THE SITE**

The *1995 Hydrogeological Investigation Report for Anderson Excavating and Wrecking Company Construction and Demolition Landfill* prepared by Howard R. Green Company Consulting Engineers provided the following geological description:

*The landfill is located in the "Western Loess Hills," which is characterized by thick wind deposited soil (loess) overlying glacial deposits. The unconsolidated sediments at the site consist of up to 200 feet of Pleistocene sediments, primarily clayey silt to silty clay (loess), showing increasing sand and clay content with depth. The thick loess section has been removed over the central portion of the site during a past failed attempt to locate gravel deposits. The Pennsylvanian bedrock beneath the site consists primarily of limestone and shale with thin coal seams. The elevation of the bedrock ranges from 994.2 to 1002.59 feet, msl.*

### **1.3 HYDROLOGY OF THE SITE**

According to the above-referenced 1995 Hydrogeological Investigation report:

*The uppermost aquifer beneath the site is the water table, which is located within the loess section. The water table elevation ranges from 1086.48 feet on the north side of the site to 1071.32 feet in the southeast corner of the site. Based on in-situ permeability tests, K-values of this loess unit range from  $7.2 \times 10^{-6}$  to  $3.1 \times 10^{-7}$  cm/sec, while transmissivity values range from 0.106 to 0.398 square feet per day.*

*The water table flow direction is primarily toward the southeast and Mosquito Creek. The primary flow direction of the lower screened interval is toward the southwest.*

*Horizontal flow gradients were found to vary from 0.010 to 0.053 in the water table aquifer and from 0.019 to 0.065 in the lower screened interval. The vertical flow gradients between the water table and the basal sand unit are downward (recharge condition) and varied from 0.027 to 0.251.*

*The horizontal flow velocity at the water table varied from  $8.0 \times 10^{-3}$  to  $9.4 \times 10^{-4}$  ft/day. The horizontal flow velocity in the basal sand unit varied from  $9.6 \times 10^{-1}$  to  $8.6 \times 10^{-6}$  ft/day. The recharge flux rate between the water table and the basal sand unit varied 0.0004 ft<sup>3</sup>/day per sq. ft. to 0.0024 ft<sup>3</sup>/day per sq. ft.*

#### **1.4 PREVIOUS LAND USE**

The Anderson Excavation Council Bluffs C&D landfill was used as a quarry prior to development as a landfill.

#### **1.5 SOLID WASTE STREAMS**

According to the January 21, 2004 Sanitary Disposal Project Permit, the facility is authorized to receive the following waste streams, each under specific conditions and restrictions:

- Solid waste in accordance with the approved Comprehensive Plan
- Construction and demolition (C&D) wastes
- Whole brick for use in the liner system leachate drainage layer
- Asphalt, wood, metal, and rubble for reuse

#### **1.6 REPORT CONTENTS**

Sampling was performed in general accordance with Iowa Administrative Code (IAC) Section 114.26(4) and the provisions identified in the landfill permit. This report addresses water quality data collected during the 2006 sampling events and discusses the following items:

- Changes to the groundwater monitoring system since the Fall 2005 Annual Water Quality Report;
- Observations made during the collection of groundwater samples;
- Results of the physical parameters measured during sample collection;
- Changes or maintenance needed in the monitoring system;
- Statistical treatment and evaluation of the chemical data;
- Evaluation of potential groundwater mounding and impacts on monitoring wells;

- Evaluation of upgradient groundwater and surface water monitoring points;
- Evaluation of potential leachate migration as detected at groundwater monitoring wells;
- Evaluation of potential impact of the landfill on surface water quality; and
- Recommendations for future monitoring.

This report also provides a summary listing of analytical data, statistical computation results, graphs of statistical exceptions, and a digital copy of the data.

## 2.0 FIELD ACTIVITIES AND PROCEDURES

Groundwater monitoring wells were developed and sampled by **BARKER LEMAR** personnel on April 18, 2006 and October 11, 2006. These activities represent the regular spring and fall semi-annual sampling events for 2006. Water samples from six (6) groundwater monitoring wells (when containing sufficient water) were collected during the 2006 sampling events. Sampling forms and analytical reports for the April sampling event were submitted previously. Sampling forms for the October sampling event are included in Appendix A.

The general field measurements and sampling procedures used are outlined below:

- Static water levels and total well depths were measured using an electronic water level indicator.
- Groundwater wells were purged of approximately three well volumes or until dry using dedicated Waterra® development/sampling pumps, disposable bailers, and vacuum pumps. Groundwater elevations were measured before and after well development.
- Field measurements of pH, temperature, and specific conductance were collected during groundwater monitoring well development and used as indicators of well conditions prior to sample collection.
- Groundwater samples were collected by using the Waterra® pump, disposable bailers, or a vacuum pump and by transferring the samples into laboratory-prepared containers. Bailers and the vacuum pump were used to facilitate collection of groundwater samples from the deep monitoring wells. The samples collected for dissolved metals analysis were field filtered using 0.45 micron filters.
- Groundwater samples were submitted for laboratory analysis under chain-of-custody procedures. Analysis was performed as indicated in the Hydrologic Monitoring System Plan (HMSP) and IAC 567 Sections 114.26(4)(e) and (f) and the provisions identified in the landfill permit.

### **3.0 MONITORING SYSTEM**

The groundwater monitoring system in-place at the site is comprised of six monitoring wells (MW-2, MW-3, MW-4, MW-9, MW-10, and MW-11). Figure 1 shows the location of the monitoring system points. The function as an upgradient, background, or downgradient sampling location for the groundwater monitoring points is depicted in Figure 1.

#### **3.1 GROUNDWATER MONITORING SYSTEM**

Two groundwater regimes (the water table aquifer and the basal sand aquifer) are monitored by the corresponding monitoring wells, as shown in Table 1.

**TABLE 1  
MONITORING WELL NETWORK**

REGIME	MONITORING WELLS
Aquifer 1 (Upper/Surficial)	Upgradient: MW-3 Downgradient: MW-2, MW-9, MW-11
Aquifer 2 (Deep Flow)	Upgradient: MW-4 Downgradient: MW-10

#### **3.2 SURFACE WATER MONITORING POINTS**

No surface water monitoring points are established at the Council Bluffs C&D Landfill.

#### **3.3 LEACHATE PIEZOMETER LOCATIONS**

No leachate piezometers are installed at the Council Bluffs C&D Landfill.

### **4.0 MONITORING SYSTEM PERFORMANCE EVALUATION**

The hydrologic monitoring system was re-evaluated to determine the reliability of the performance of the monitoring well points based on the following tasks.

- The high and low groundwater levels were compared to the well depth/screened interval.
- Water level conditions in the monitoring wells were reviewed to evaluate possible changes in the hydrologic setting/flow paths due to landfilling activities.
- Well depths were measured to evaluate integrity and siltation
- A visual inspection of well integrity was performed during the sampling events.

#### **4.1 WATER LEVEL MEASUREMENTS**

The results of the water level measurements and well depth measurements are shown in Table 2 (Summary of Groundwater Levels and Well Performance) on the following page. The data indicate groundwater elevations ranged from 1058.05 feet (MW-4) to 1080.42 feet (MW-3) above mean sea level (amsl). Comparing the groundwater levels recorded during the last two sampling events, groundwater levels decreased in the six wells from the April to October sampling events. The fluctuations ranged from a decrease of 0.55 feet in MW-2 to a decrease of 2.50 feet in MW-4.

Water levels were observed to be within the screened interval in monitoring wells MW-2, MW-3, MW-9, and MW-11 during sampling events in 2006. Monitoring wells MW-4 and MW-10 were observed to have water levels above the reported top of screen elevations, ranging from 51.45 feet to 59.54 feet above the screen. It should be noted that monitoring wells MW-4 and MW-10 are the deep wells in well the nests and are expected to have water levels above the top of screen. Water samples were not collected at monitoring well MW-3 during the October 2006 sampling event and at MW-2 during both the 2006 sampling events due to insufficient water levels.

#### **4.2 GROUNDWATER FLOW**

Groundwater contours were determined for Aquifer 1 (water table aquifer, Figure 2) and Aquifer 2 (deep flow, Figure 3) using groundwater elevation data collected by **BARKER LEMAR** personnel on October 11, 2006. The contours, which represent the water table or upper aquifer water level elevations, indicate a general flow direction to the southeast with an approximate gradient of 0.018 ft/ft. The contours, which represent the deep flow aquifer elevations, indicate a general flow direction to the west-northwest with an approximate gradient of 0.008 ft/ft.

#### **4.3 WELL SILTATION**

The monitoring well depths were measured by **BARKER LEMAR** personnel during the April and October sampling events. The well depths were within 2.1 feet of the installed depth, with the exception of MW-10, which had recorded depth of 4.4 foot shallower than the installed depth during the October 2006 sampling event. Well depths were unable to be determined at MW-10 during the April 2006 sampling event and at MW-4 during both 2006 sampling events since well depth exceeded the water level indicator capacity. Based on the ability of the dedicated purging

**TABLE 2**  
**SUMMARY OF GROUNDWATER LEVELS AND WELL PERFORMANCE**

Anderson Excavating Company  
 Council Bluffs C&D Landfill  
 Council Bluffs, Iowa  
 Permit No. 78-SDP-04-89P  
 Project No. ANDEX 06001

WELL	TOC	TOS	TD	DATUM	DATE OF MEASUREMENT	
					April 18, 2006	October 11, 2006
MW-2	1128.28	1075.86	62.4	GROUNDWATER LEVEL	60.25	60.80
				GROUNDWATER ELEVATION	1068.03	1067.48
				MEASURED WELL DEPTH	61.0	60.8
MW-3	1196.12	1087.12	119.0	GROUNDWATER LEVEL	115.70	116.80
				GROUNDWATER ELEVATION	1080.42	1079.32
				MEASURED WELL DEPTH	116.9	116.9
MW-4	1195.65	1001.01	199.6	GROUNDWATER LEVEL	135.1	137.6
				GROUNDWATER ELEVATION	1060.55	1058.05
				MEASURED WELL DEPTH*	200+	200+
MW-9	1153.87	1076.22	92.7	GROUNDWATER LEVEL	79.40	80.35
				GROUNDWATER ELEVATION	1074.47	1073.52
				MEASURED WELL DEPTH	93.0	93.0
MW-10	1167.89	1010.44	167.5	GROUNDWATER LEVEL	104.95	106.00
				GROUNDWATER ELEVATION	1062.94	1061.89
				MEASURED WELL DEPTH*	150 +	163.1
MW-11	1167.84	1080.31	102.5	GROUNDWATER LEVEL	96.25	96.85
				GROUNDWATER ELEVATION	1071.59	1070.99
				MEASURED WELL DEPTH	102.6	102.5

NOTES: All measurements in feet  
 TOC - Top of casing elevation, reference for water level measurements  
 TOS - Top of screen elevation  
 TD - Total depth (as originally reported)  
 \* Exceeded water level indicator capacity

system to remove accumulated sediment, it appears unlikely that siltation will adversely impact the groundwater monitoring points at this site.

#### **4.4 SAMPLING POINT OBSERVATIONS**

In general, problems regarding the integrity of the monitoring wells were not noted.

#### **4.5 FREQUENCY OF NON-FLOWING SAMPLING POINTS**

Surface water monitoring is not required at the Council Bluffs C&D Landfill.

#### **4.6 DISCUSSION OF POTENTIAL GROUNDWATER MOUNDING**

There are no piezometers at this site; therefore, this section does not apply.

#### **4.7 DISCUSSION OF UPGRAIDENT MONITORING POINTS**

##### Upgradient Groundwater Monitoring Points

The upgradient monitoring well for the water table aquifer (Aquifer 1) is MW-3. The water table contours as shown on Figure 2 indicate that the groundwater level in MW-3 is at a higher elevation than the groundwater levels within the adjacent portion of the waste boundary. In addition, comparing the water quality data for MW-3 with the downgradient wells, degradation of the groundwater quality due to leachate influence has not been observed. The following is a summary of the upgradient monitoring well for water table aquifer:

No statistical exceedances were measured in upgradient monitoring well MW-3 in 2006. This well was not sampled during the October 2006 sampling event due to an insufficient amount of water available to collect water samples. Water quality data for this well is available beginning in April 2000. No new minimum or maximum concentrations were observed in 2006. No established trends in concentrations were noted in the analytes.

The upgradient monitoring well for the basal sand aquifer (Aquifer 2) is MW-4. The water table elevations as shown on Figure 3 indicate that the groundwater level in MW-4 is not at a higher elevation than the groundwater levels in the downgradient monitoring well for this aquifer. However, comparison of the water quality data for MW-4 with downgradient well for this aquifer indicates degradation of the groundwater quality due to leachate influence has not been observed. Review of the groundwater flow for Aquifer 1 indicates a distinct and well defined flow

in the southwest direction. Based on the previously referenced 1995 *H/R*, the vertical flow is downward (recharge) which indicates Aquifer 1 may be influencing monitoring well MW-10. Therefore, despite apparent groundwater flow from MW-10 to MW-4, it appears MW-4 is the appropriate upgradient monitoring well. The following is a summary of the upgradient monitoring well for the deep flow aquifer:

No statistical exceedances were measured in upgradient monitoring well **MW-4** in 2006. Water quality data for this well is available beginning in April 2000. A new minimum concentration was reported for chloride in the April 2006 sampling event. It should be noted that the chloride concentration in the April 2006 sampling event was below the method detection limit. No new maximum concentration was observed in the 2006 sampling events. No established trends in concentrations were noted in the analytes.

#### **4.8 MONITORING SYSTEM RECOMMENDATIONS**

Hydrologic monitoring at the site has been conducted in accordance with the Hydrologic Monitoring System Plan (HMSP) dated June 30, 1995, and revisions dated August 29, 1995, as submitted by Howard R. Green Company and approved on August 31, 1995 and the approved 1999 Site Development and Operation Addendum Plan, dated August 4, 1999, and Plan Set, dated August 11, 1999 by **BARKER LEMAR**, and the special provisions identified in the landfill permit. No monitoring system recommendations are necessary at this time.

#### **5.0 DATA EVALUATION METHODS**

The statistical evaluation of the chemical data was completed in accordance with IAC 567 Section 114.26(6).

#### **5.1 WELL GROUPING**

The groundwater regimes discussed in Section 3.1 were evaluated separately. Upgradient monitoring points were selected from each group for statistical comparison. The selection of upgradient points were based on the hydrogeological assessments performed by others, the measured chemical and physical data, and guidance provided by the IDNR.

## **5.2 CONTROL LIMITS**

Once the groupings were completed, the mean, standard deviation, and control limits were calculated for each of the chemical parameters in the upgradient monitoring points. The control limit represents the limit at which a statistical exceedance beyond the background concentration has occurred. For the purpose of this evaluation, the control limits were defined as the mean of the concentrations for the upgradient monitoring point plus/minus two times the standard deviation for each parameter. The lower control limit was only used for evaluation of pH levels.

## **5.3 METHOD DETECTION LIMITS**

Many of the parameters were observed at concentrations less than the method detection limits (MDLs). The mean, standard deviation, and control limit were computed by utilizing the reporting limit value in the computations (i.e., <0.05 becomes 0.05). In situations where the upgradient monitoring point concentrations were consistently below the MDLs, the standard deviation and control limits were not calculated. It should be noted that in some cases in which control limits were not calculated for the aforementioned reason, the measured downgradient concentration exceeded the upgradient mean.

## **5.4 REGULATORY ACTION LIMITS**

In addition to evaluating the concentration in comparison to upgradient control limits, the concentrations were also compared to current United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs), Negligible Risk Levels (NRLs), and Health Advisory Levels (HALs). IDNR guidance documents define the "action level" for groundwater as the following:

*"As defined by 567 - 133.2 (455B, 455E), action level means the HAL, if one exists. If there is no HAL, then the NRL, if one exists. If there is no HAL or NRL, then the MCL. If there is no HAL, NRL, or MCL, an action level may be established by the department based on current technical literature and recommended guidelines of the USEPA and recognized experts, on a case-by-case basis."*

No regulatory action levels were exceeded in the 2006 sampling event at the Council Bluffs C&D Landfill.

## **6.0 EVALUATION OF WATER QUALITY PARAMETERS**

Section 6.1 provides a summary of statistical exceedances, upgradient mean exceedances, new maximum and minimum concentrations, and generally observed trends for each downgradient monitoring point. Please note, for parameters with insufficient historical data, typically four data points or less, discussions in regard to minimum/maximum concentrations or generally observed trends are not included.

The historical analytical results of the upgradient and downgradient monitoring wells are presented in Appendix B (Summary of Groundwater Chemistry). The analytical data reports for the October 2006 sampling event are included in Appendix C. Parameters were graphed in relation to the current upgradient mean and standard deviation for each group. Results that exceeded the current upgradient control limits are presented in the Exceedance Tables in Appendix D. The graphs depicting the changes of each parameter in each downgradient monitoring point are included in Appendix E. Note that some graphs may depict values that exceed the upper control limit and are not included in the summary of exceedances table. These values are not reported as exceedances due to the upper control limit being less than the detection level of that parameter's test method.

### **6.1 MONITORING WELL SUMMARY**

Groundwater monitoring at monitoring well **MW-2** was not conducted due to insufficient amounts water available to collect samples during both the April and October 2006 sampling events. Water quality data for this well is available beginning in February 1997.

No statistical exceedances were measured in monitoring well **MW-9** in 2006. Water quality data for this well is available beginning in November 1996. No new minimum or maximum concentrations were observed in 2006. No established trends in concentrations were noted in the analytes.

Statistical exceedances were measured in monitoring well **MW-10** for chloride during both the April and October 2006 sampling events. Water quality data for this well is available beginning in November 1996. No new minimum or maximum concentrations were observed in 2006. No established trends in concentrations were noted in the analytes.

No statistical exceedances were measured in monitoring well MW-11 in 2006. Water quality data for this well is available beginning in November 1996. No new minimum or maximum concentrations were observed in 2006. No established trends in concentrations were noted in the analytes.

## 7.0 SUMMARY AND RECOMMENDATIONS

### 7.1 POTENTIAL LEACHATE MIGRATION

A summary of the 2005 and 2006 exceedances computed for the downgradient monitoring wells are shown in Tables 3A and 3B, respectively, below.

**TABLE 3A  
2005 SUMMARY OF STATISTICAL EXCEEDANCES**

Parameter	MW-10	MW-11
Chloride	4,10	
Specific Conductance		10

4 = April 2005 sampling event                    10 = October 2005 sampling event

**TABLE 3B  
2006 SUMMARY OF STATISTICAL EXCEEDANCES**

Parameter	MW-10	MW-11
Chloride	4,10	
Specific Conductance		

4 = April 2006 sampling event                    10 = October 2006 sampling event

Minor changes in water quality from last year were noted. One less overall exceedance was observed from 2005 to 2006 which pertains to monitoring well MW-11 for specific conductance.

No established trends in concentrations were noted in the analytes at the measured monitoring wells. The data should continue to be reviewed as new data becomes available to determine if the indicator parameter trend observations are consistent.

Overall, concentrations of indicator parameters have revealed relative consistency within the range of previous measurements. A complete analysis of the historical data can be found in Appendix E. Historical trends should be considered during the evaluation of the exceedance values.

In general, it does not appear that leachate migration beyond the waste management boundary is occurring as the number of statistical exceedances were limited and consistent with last year. It was also noted that no regulatory action levels were exceeded in the 2006 sampling events.

## **7.2 POTENTIAL RECEPTORS**

As required pursuant to the letters from IDNR as referenced in Section 1.0 above, if MCLs are exceeded at any groundwater monitoring point, provide information on potential receptors. Since no MCLs were exceeded, this section is not applicable.

## **7.3 IMPACT OF THE LANDFILL ON SURFACE WATER QUALITY**

Surface water quality is not monitored at the Council Bluffs C&D Landfill.

## **7.4 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE MONITORING**

Based on these results, **BARKER LEMAR** recommends the following items be conducted to continue monitoring the groundwater quality at the site:

- Continue routine semi-annual and annual water sampling for the parameters listed in IAC Chapter 114.26(4)(e) and (f).

**BARKER LEMAR** has requested discontinuing sampling for dissolved arsenic in monitoring well MW-3 on the September 15, 2006 correspondence.

## **8.0 LEACHATE CONTROL SYSTEM PERFORMANCE EVALUATION**

The leachate collection system at the Council Bluffs C&D Landfill consists of three perforated collection pipes that drain into a main header, which empties into a 12,000 gallon storage tank. The main header line runs along the east toe of the Phase I area from the southeast corner of Phase II area to the storage tank. The storage tank will be replaced by a storage lagoon, when needed. In addition, a perforated pipe was added with the main header line. This will provide an extra collection pipe along the east toe of the Phase I area. The leachate collection system is shown on Figure 1. The leachate that accumulates in the storage tank is pumped from the tank and then re-circulated within the current lined waste area. Table 4 depicts 2006 leachate tank readings obtained from the Leachate Control System Monitoring Sheet for 2006 (Appendix F).

**TABLE 4**  
**2006 LEACHATE TANK READINGS**

Date of Tank Level Checked	Tank Level % Full	Tank Level In Gallons	Leachate Tank Pumping Date	Method of Leachate Treatment (Recirculation or POTW*)
January	75%	9,000	1-5-06	Recirculation
February	14%	1,680		
March	28%	3,360		
April	90%	10,800	4-12-06	Recirculation
May	25%	3,000		
June	40%	4,800		
July	55%	6,600	7-15-06	Recirculation
August	15%	1,800		
September	40%	4,800		
October	65%	7,800	10-4-06	Recirculation
November	85%	10,200		

\* POTW (Publicly Owned Treatment Works)

## 9.0 GENERAL COMMENTS

The analysis and opinions expressed in this report are based upon data obtained from the samples collected at the indicated locations and from any other information discussed in this report. This report does not reflect any variations in subsurface stratigraphy, hydrogeology, or chemical concentrations that may occur between sampling locations or across the site. Actual subsurface conditions may vary and may not become evident without further exploration.

**BARKER LEMAR** has prepared this report for the exclusive use of our client for the specific application to the project discussed. No warranty is expressly stated or implied in this report. **BARKER LEMAR** has relied upon information furnished by others as noted in the report, and **BARKER LEMAR** accepts no responsibility for any deficiency, misstatements, or inaccuracy in this report as a result of misstatements, omissions, misrepresentations, fraudulent, or inaccurate information or data provided by others.

## 10.0 REFERENCES

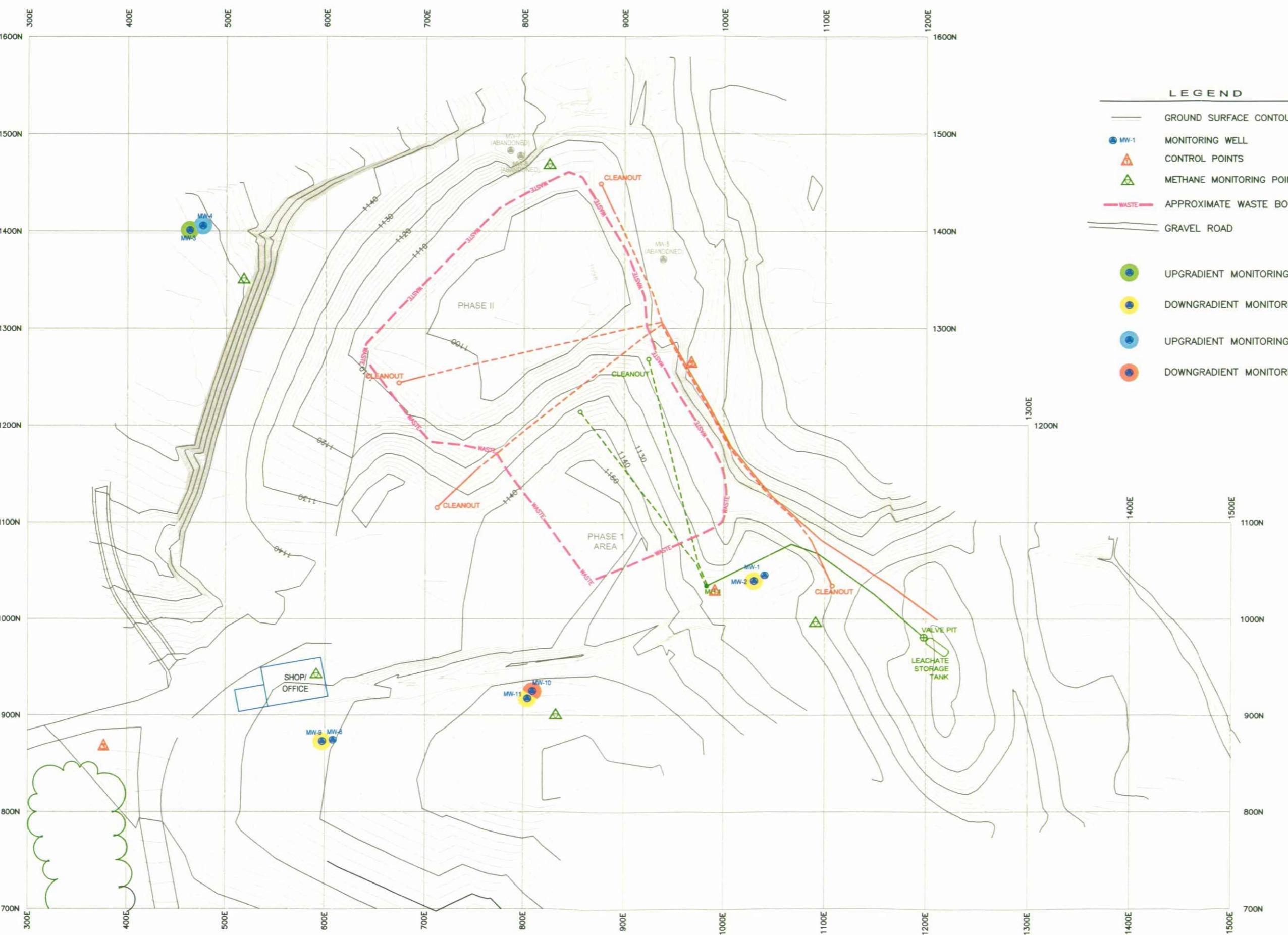
1. Geotechnical Services Inc., *Report of Geologic and Preliminary Hydrogeologic Site Characterization*. July 1989.
2. Howard R. Green Company, Consulting Engineers. *Hydrogeological Investigation Report*. June 1995.
3. Howard R. Green Company, Consulting Engineers. *Hydrologic Monitoring System Plan*. June 1995.
4. Howard R. Green Company, Consulting Engineers. *Construction & Development Plan*. June 1995.
5. Barker Environmental Services, Inc. *1997 Annual Water Quality Report, Anderson Excavating Company C&D Landfill*. December 3, 1997.
6. Iowa Department of Natural Resources. *Annual Report 1997, Registry of Hazardous Waste or Hazardous Substance Disposal Sites and Hazardous Waste Remedial Fund*. January 1, 1998.
7. Barker, Lemar & Associates, Inc. *1998 Annual Water Quality Report, Anderson Excavating Company C&D Landfill*. November 25, 1998.
8. Barker, Lemar & Associates, Inc. *1999 Annual Water Quality Report, Anderson Excavating Company C&D Landfill*. November 29, 1999.
9. Barker, Lemar & Associates, Inc. *2000 Annual Water Quality Report, Anderson Excavating Company C&D Landfill*. November 28, 2000.
10. **BARKER LEMAR ENGINEERING CONSULTANTS**. *2001 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill*. November 28, 2001.
11. **BARKER LEMAR ENGINEERING CONSULTANTS**. *2002 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill*. November 18, 2002.
12. **BARKER LEMAR ENGINEERING CONSULTANTS**. *2003 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill*. November 26, 2003.
13. **BARKER LEMAR ENGINEERING CONSULTANTS**. *2004 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill*. November 29, 2004.
14. **BARKER LEMAR ENGINEERING CONSULTANTS**. *2005 Annual Water Quality Report and Leachate Control System Performance Report, Anderson Excavating Company C&D Landfill*. November 2005.

## **FIGURES**

SCALE



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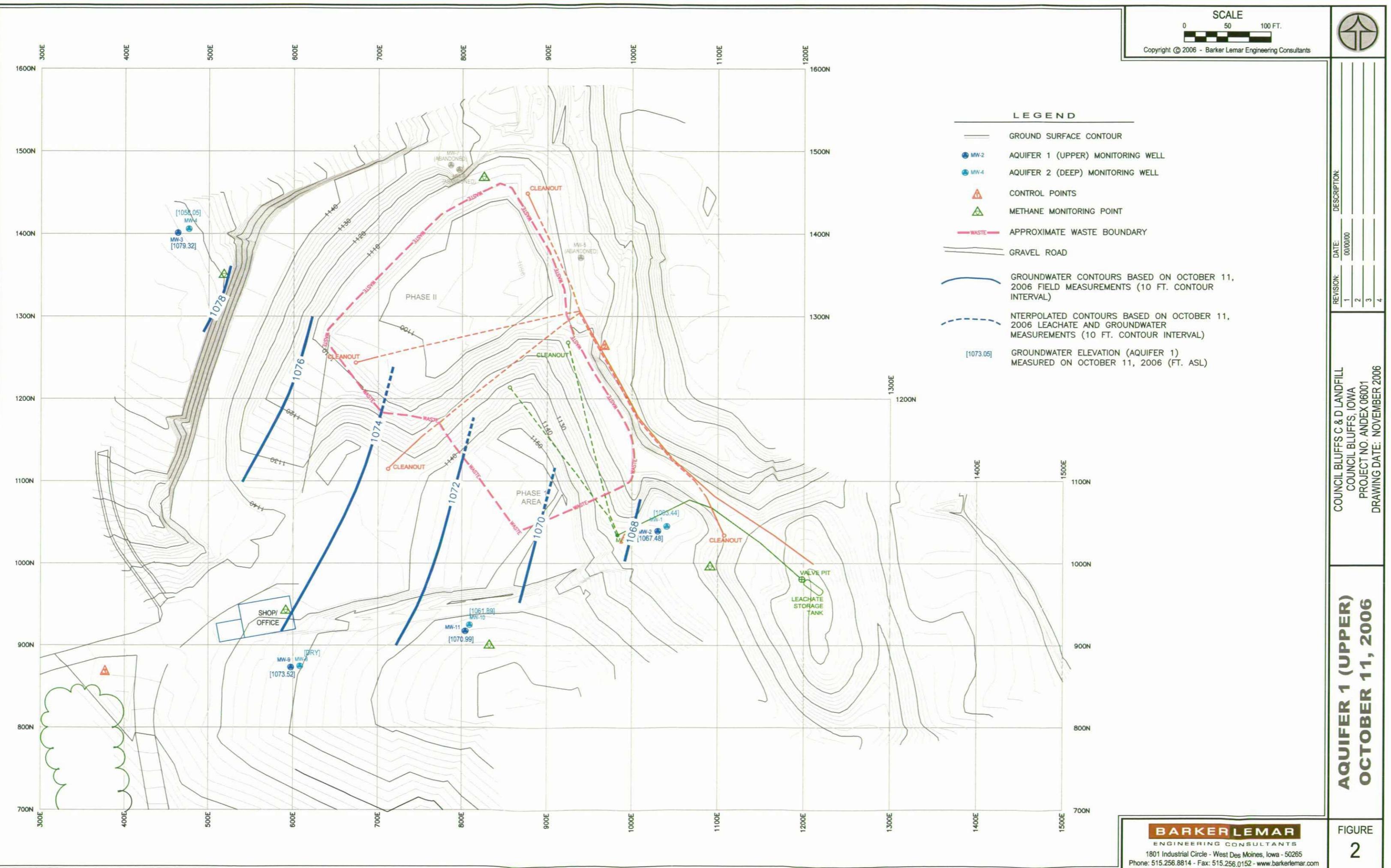
**LEGEND**

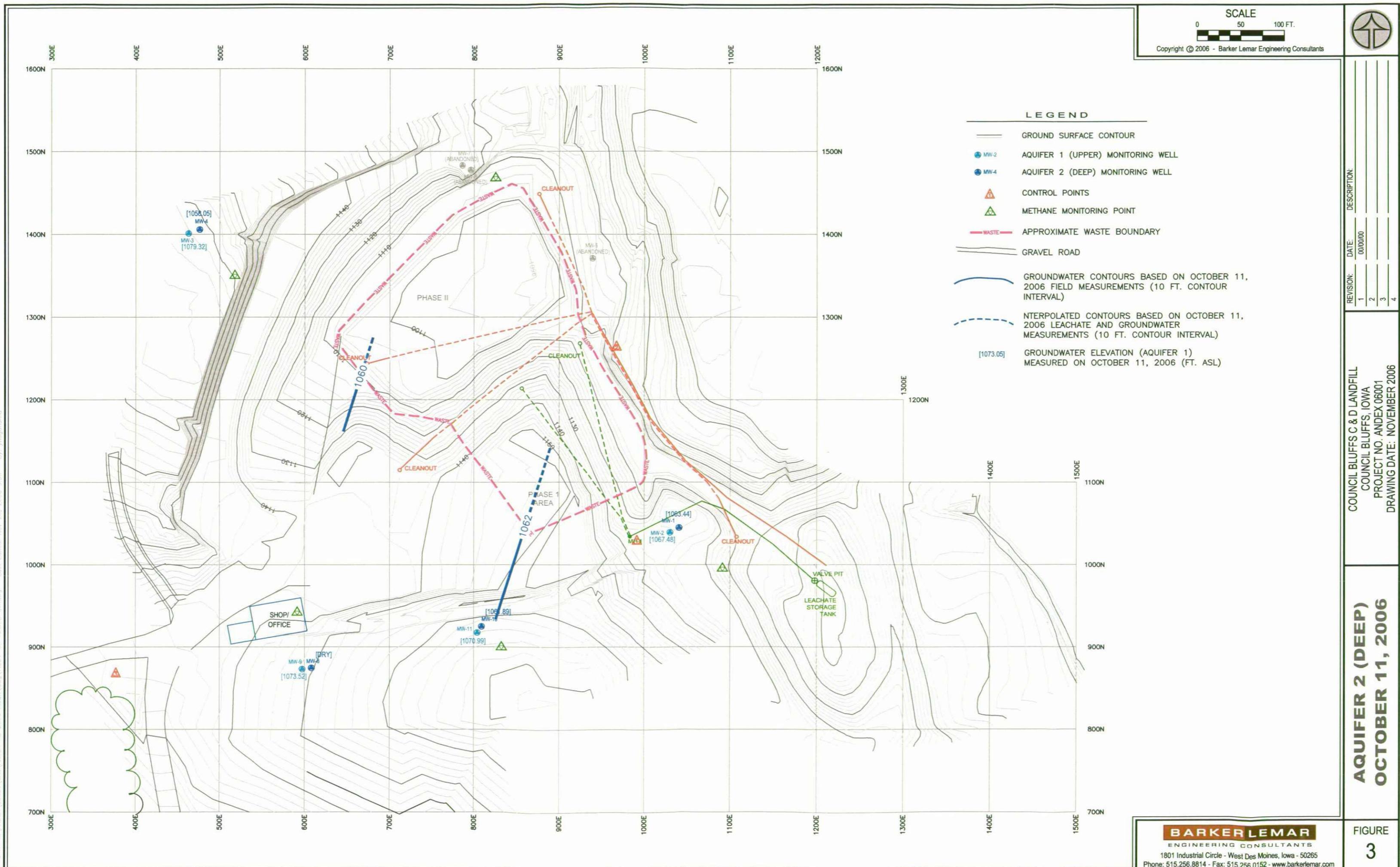
- GROUND SURFACE CONTOUR
- MONITORING WELL
- CONTROL POINTS
- METHANE MONITORING POINT
- APPROXIMATE WASTE BOUNDARY
- GRAVEL ROAD
- UPGRADE MONITORING WELL (AQUIFER 1)
- DOWNGRADIENT MONITORING WELL (AQUIFER 1)
- UPGRADE MONITORING WELL (AQUIFER 2)
- DOWNGRADIENT MONITORING WELL (AQUIFER 2)

COUNCIL BLUFFS C & D LANDFILL  
COUNCIL BLUFFS, IOWA  
PROJECT NO. ANDEX 06001  
DRAWING DATE: NOVEMBER 2006

**APPROVED MONITORING NETWORK**

FIGURE 1





AQUIFER 2 (DEEP)  
OCTOBER 11, 2006

**FIGURE**  
**3**

**APPENDIX A**  
**FALL SAMPLING FORMS**

## LANDFILL GROUNDWATER SAMPLING DATA SHEET

### Project Information

Project Name: Anderson Excavating Co.  
 Project Location: Council Bluffs C&D  
 Project Number: ANDEX 06001  
 SLF Permit No. 78-SDP-04-89P  
 Weather Conditions: Cloudy, 40's degrees Fahrenheit, very windy

### Sampling Information

Date Sampled:	10/11/2006	
Sampling Crew:	Kevin Hensley	
Equipment:	Water Level	Heron
	pH/Cond.	Hanna

Well No.	Date	Static Water Level (ft.)	Measured Well Depth (ft.)	Time at Start of Purging	Volume Plurged (gals.)	Well Purging Information			Stabilized pH (S.U.)	Stabilized Conductivity (µScm.)	Stabilized Temperature (C.)	Well Properly Capped (Y/N)	Litter or Standing Water (Y/N)	Comments / Time Sampled
						Water Depth After Purging (ft.)	Purging Equipment (See Note 1.)	Comments / Time Sampled						
MW-2	10/11/2006	60.80	60.8	NM	NA	NA	NA	NA	NA	NA	NA	Y	N	Not enough water to sample
MW-3	10/11/2006	116.80	116.9	NM	NA	NA	NA	NA	NA	NA	NA	Y	N	Not enough water to sample
MW-4	10/11/2006	137.60	200 +	3:35 PM	132	142.70	142.00	S	7.50	742	10.7	Y	N	
MW-9	10/11/2006	80.35	93.0	1:30 PM	6	87.60	87.45	B	7.37	752	11.5	Y	N	
MW-10	10/11/2006	106.00	163.1	2:00 PM	27	122.60	122.00	B	7.62	784	10.9	Y	N	
MW-11	10/11/2006	96.85	102.5	2:45 PM	3	98.90	98.50	B	7.47	819	11.3	Y	N	

Note 1: VALID TYPES - Bailer (B), Submersible (S), Waterera (W), Vacuum Pump (V), Dedicated Bailer (DB), Other (describe in comments)

**FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT**

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-2</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>

Name of Person Sampling Kevin Hensley

**A. MONITORING WELL/PIEZOMETER CONDITIONS**

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

**B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)**

Top of Casing Elevation	<u>1128.28</u>	feet	Ground Elevation (ft.)	<u>1126.86</u>
Drilled Well Depth (ft.)	<u>62.4</u>	feet	Casing Dia. (in.)	<u>4.0</u>
Measured Well Depth (ft.)	<u>60.8</u>	feet		

Equipment Used	<u>Heron</u>		
----------------	--------------	--	--

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>NM</u>	<u>60.80</u>	<u>1067.48</u>
After Purging	<u></u>	<u></u>	<u>NA</u>	<u>NA</u>
Before Sampling	<u></u>	<u></u>	<u>NA</u>	<u>NA</u>

**C. WELL PURGING\***

Quantity of Water Removed from Well (gallons)	<u>NA</u>
No. of Well Volumes (based on current water level)	<u>NA</u>
Was well pumped/bailed dry?	<u>NA</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning

**D. FIELD MEASUREMENTS\***

Weather Conditions	<u>Cloudy, 40's degrees Fahrenheit, very windy</u>		
--------------------	--	--	--

Field Measurements (after stabilization):

Temperature	<u>NA</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>NA</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>NA</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS	<u>Not enough water for analysis</u>		
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IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

**FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT**

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-3</u>	Upgradient	<u>X</u>
		Downdrgradient	
Name of Person Sampling	<u>Kevin Hensley</u>		

**A. MONITORING WELL/PIEZOMETER CONDITIONS**

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u> </u>		

**B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)**

Top of Casing Elevation	<u>1196.12</u>	feet	Ground Elevation (ft.)	<u>1195.12</u>
Drilled Well Depth (ft.)	<u>119.0</u>	feet	Casing Dia. (in.)	<u>4.0</u>
Measured Well Depth (ft.)	<u>116.9</u>	feet		

Equipment Used	<u>Heron</u>		
----------------	--------------	--	--

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>NM</u>	<u>116.80</u>	<u>1079.32</u>
After Purging	<u> </u>	<u> </u>	<u>NA</u>	<u>NA</u>
Before Sampling	<u> </u>	<u> </u>	<u>NA</u>	<u>NA</u>

**C. WELL PURGING**

Quantity of Water Removed from Well (gallons)	<u>NA</u>
No. of Well Volumes (based on current water level)	<u>NA</u>
Was well pumped/bailed dry?	<u>NA</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning	<u>disposable bailer</u>
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**D. FIELD MEASUREMENTS**

Weather Conditions	<u>Cloudy, 40's degrees Fahrenheit, very windy</u>		
--------------------	--	--	--

Field Measurements (after stabilization):

Temperature	<u>NA</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>NA</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>NA</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

COMMENTS	<u>Not enough water for analysis</u>		
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IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

**FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT**

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-4</u>	Upgradient	<u>X</u>
		Downgradient	
Name of Person Sampling	<u>Kevin Hensley</u>		

**A. MONITORING WELL/PIEZOMETER CONDITIONS**

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u>                  </u>		

**B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)**

Top of Casing Elevation	<u>1195.65</u>	feet	Ground Elevation (ft.)	<u>1194.01</u>
Drilled Well Depth (ft.)	<u>199.6</u>	feet	Casing Dia. (in.)	<u>4.0</u>
Measured Well Depth (ft.)	<u>200 +</u>	feet		

Equipment Used	<u>Heron</u>		
----------------	--------------	--	--

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>3:35 PM</u>	<u>137.60</u>	<u>1058.05</u>
After Purging	<u>                  </u>	<u>                  </u>	<u>142.70</u>	<u>1052.95</u>
Before Sampling	<u>                  </u>	<u>                  </u>	<u>142.00</u>	<u>1053.65</u>

**C. WELL PURGING\***

Quantity of Water Removed from Well (gallons)	<u>132</u>
No. of Well Volumes (based on current water level)	<u>3.3</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Submersible</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning	<u>                  </u>
--------------------------------------	---------------------------

**D. FIELD MEASUREMENTS\***

Weather Conditions	<u>Cloudy, 40's degrees Fahrenheit, very windy</u>		
--------------------	--	--	--

Field Measurements (after stabilization):

Temperature	<u>10.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>7.50</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>742</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

**COMMENTS**

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\* - Omit if only measuring groundwater elevations.

**FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT**

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-9</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Kevin Hensley</u>		

**A. MONITORING WELL/PIEZOMETER CONDITIONS**

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

**B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)**

Top of Casing Elevation	<u>1153.87</u>	feet	Ground Elevation (ft.)	<u>1151.22</u>
Drilled Well Depth (ft.)	<u>92.7</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>93.0</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>1:30 PM</u>	<u>80.35</u>	<u>1073.52</u>
After Purging	<u></u>	<u></u>	<u>87.60</u>	<u>1066.27</u>
Before Sampling	<u></u>	<u></u>	<u>87.45</u>	<u>1066.42</u>

**C. WELL PURGING\***

Quantity of Water Removed from Well (gallons)	<u>6</u>
No. of Well Volumes (based on current water level)	<u>2.9</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:

Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning	<u>disposable bailer</u>
--------------------------------------	--------------------------

**D. FIELD MEASUREMENTS\***

Weather Conditions	<u>Cloudy, 40's degrees Fahrenheit, very windy</u>		
--------------------	--	--	--

Field Measurements (after stabilization):

Temperature	<u>11.5</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>7.37</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec. Conductance	<u>752</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

**COMMENTS**

\* - Omit if only measuring groundwater elevations.

**FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT**

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-10</u>	Upgradient	<u>                  </u>
		Downgradient	<u>X</u>

Name of Person Sampling Kevin Hensley

**A. MONITORING WELL/PIEZOMETER CONDITIONS**

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u>                  </u>		

**B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)**

Top of Casing Elevation	<u>1167.89</u>	feet	Ground Elevation (ft.)	<u>1165.44</u>
Drilled Well Depth (ft.)	<u>167.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>163.1</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>2:00 PM</u>	<u>106.00</u>	<u>1061.89</u>
After Purging	<u>                  </u>	<u>                  </u>	<u>122.60</u>	<u>1045.29</u>
Before Sampling	<u>                  </u>	<u>                  </u>	<u>122.00</u>	<u>1045.89</u>

**C. WELL PURGING**

Quantity of Water Removed from Well (gallons)	<u>27</u>
No. of Well Volumes (based on current water level)	<u>2.7</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:

Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning disposable bailer

**D. FIELD MEASUREMENTS**

Weather Conditions Cloudy, 40's degrees Fahrenheit, very windy

Field Measurements (after stabilization):

Temperature	<u>10.9</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>7.62</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>784</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

**COMMENTS**

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

# FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Excavating Co.</u>	Permit No.	<u>78-SDP-04-89P</u>
MW/Piezometer No.	<u>MW-11</u>	Upgradient	<u></u>
		Downgradient	<u>X</u>
Name of Person Sampling	<u>Kevin Hensley</u>		

## A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u></u>		

## B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>1167.84</u>	feet	Ground Elevation (ft.)	<u>1165.31</u>
Drilled Well Depth (ft.)	<u>102.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>102.5</u>	feet		
Equipment Used	<u>Heron</u>			

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/11/2006</u>	<u>2:45 PM</u>	<u>96.85</u>	<u>1070.99</u>
After Purging	<u></u>	<u></u>	<u>98.90</u>	<u>1068.94</u>
Before Sampling	<u></u>	<u></u>	<u>98.50</u>	<u>1069.34</u>

## C. WELL PURGING

Quantity of Water Removed from Well (gallons)	<u>3</u>
No. of Well Volumes (based on current water level)	<u>3.3</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Bailer</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>
If not dedicated, method of cleaning	<u>disposable bailer</u>		

## D. FIELD MEASUREMENTS

Weather Conditions Cloudy, 40's degrees Fahrenheit, very windy

Field Measurements (after stabilization):

Temperature	<u>11.3</u>	Units	<u>Celsius</u>
Equipment Used	<u>Hanna</u>		
pH	<u>7.47</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Hanna</u>		
Spec.Conductance	<u>819</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Hanna</u>		

## COMMENTS

IDNR Form 542-1322

\* - Omit if only measuring groundwater elevations.

**APPENDIX B**  
**SUMMARY OF GROUNDWATER CHEMISTRY**



## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-04-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Chemical Oxygen Demand - mg/L	11/8/1996	NM	NM	NM	<5.00	<5.00	6.00	<5.00	5.60
	2/27/1997	<5.00	NM	NM	<5.00	<5.00	6.20	<5.00	<5.00
	5/12/1997	NM	NM	NM	<5.00	23.0	<5.00	6.50	<5.00
	7/23/1997	NM	NM	NM	6.70	<5.00	<5.00	<5.00	<5.00
	10/16/1997	NM	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	4/7/1998	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	10/16/1998	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	4/16/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	<5.00	<5.00
	10/7/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	NM	<5.00
	4/5/2000	<10.0	<10.0	14.0	NM	NM	<10.0	NM	<10.0
	10/12/2000	<10.0	<10.0	50.0	NM	NM	<10.0	<10.0	<10.0
	3/27/2001	<10.0	<10.0	56.0	NM	NM	<10.0	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	<10.0	<10.0	
	10/3/2001	<10.0	<10.0	55.0	NM	NM	<10.0	<10.0	NM
	4/23/2002	<10.0	<10.0	53.0	NM	NM	<10.0	<10.0	NM
	4/30/2002	NM	NM	NM	NM	NM	~NM	NM	<10.0
	10/3/2002	<10.0	<10.0	30.0	NM	NM	<10.0	<10.0	<10.0
	4/17/2003	6.50	6.00	8.50	NM	NM	5.30	8.40	9.80
	10/15/2003	<5.00	<5.00	<5.00	NM	NM	<5.00	<5.00	<5.00
	4/15/2004	<5.00	5.60	<5.00	NM	NM	7.40	5.80	<5.00
	10/4/2004	<5.00	<5.00	33.0	NM	NM	<5.00	<5.00	<5.00
	4/5/2005	<5.00	<5.00	<5.00	NM	NM	<5.00	<5.00	<5.00
	10/10/2005	NM	12.0	<5.00	NM	NM	<5.00	<5.00	<5.00
	4/18/2006	NM	10.9	<5.00	NM	NM	8.80	7.00	<5.00
	10/11/2006	NM	NM	8.60	NM	NM	6.40	<5.00	<5.00
Chloride - mg/L	11/8/1996	NM	NM	NM	<5.00	<5.00	<5.00	18.0	9.80
	2/27/1997	<5.00	NM	NM	<5.00	<5.00	<5.00	19.0	10.0
	5/12/1997	NM	NM	NM	<5.00	5.20	<5.00	25.0	10.0
	7/23/1997	NM	NM	NM	<5.00	5.60	<5.00	28.0	9.80
	10/16/1997	NM	NM	NM	<5.00	6.10	<5.00	<5.00	<5.00
	4/7/1998	<5.00	NM	NM	5.00	6.50	<5.00	<5.00	<5.00
	10/16/1998	<5.00	NM	NM	<5.00	5.50	5.90	10.0	7.60
	4/16/1999	<5.00	NM	NM	19.0	19.0	27.0	19.0	19.0
	10/7/1999	<5.00	NM	NM	<5.00	<5.00	<5.00	NM	8.60
	4/5/2000	<10.0	24.0	<10.0	NM	NM	<10.0	NM	<10.0
	10/12/2000	<10.0	34.0	14.0	NM	NM	<10.0	15.0	<10.0
	3/27/2001	<10.0	38.0	<10.0	NM	NM	<10.0	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	14.0	23.0
	10/3/2001	<10.0	51.0	14.0	NM	NM	<10.0	29.0	NM
	4/23/2002	<10.0	54.0	17.0	NM	NM	17.0	28.0	NM
	4/30/2002	NM	<10.0						
	10/3/2002	<10.0	52.0	11.0	NM	NM	<10.0	23.0	<10.0
	4/17/2003	<5.00	58.9	6.80	NM	NM	11.4	34.7	9.60
	10/15/2003	<5.00	52.3	5.30	NM	NM	7.80	35.2	9.10
	4/15/2004	<5.00	55.9	5.30	NM	NM	9.30	37.2	9.30
	10/4/2004	20.5	66.6	5.50	NM	NM	45.3	64.4	38.9
	4/5/2005	<5.00	55.0	5.20	NM	NM	8.70	34.5	8.30
	10/10/2005	NM	19.4	8.10	NM	NM	13.3	42.2	8.60
	4/18/2006	NM	58.4	<5.00	NM	NM	8.79	34.2	8.35
	10/11/2006	NM	NM	5.34	NM	NM	9.21	35.2	8.87



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Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Iron, Dissolved - mg/L	11/8/1996	NM	NM	NM	<0.1000	0.1100	0.1100	0.1400	0.6400
	2/27/1997	0.4700	NM	NM	0.9800	0.1900	<0.1000	0.5300	<0.1000
	5/12/1997	NM	NM	NM	0.2200	0.2900	0.1400	<0.1000	<0.1000
	7/23/1997	NM	NM	NM	0.2300	0.1600	0.1300	<0.1000	0.1100
	10/16/1997	NM	NM	NM	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
	4/7/1998	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
	10/16/1998	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
	4/16/1999	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000
	10/7/1999	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000	NM	0.7500
	4/5/2000	<0.0300	0.2670	<0.0300	NM	NM	<0.0300	NM	<0.0300
	10/12/2000	<0.0300	<0.0300	0.1000	NM	NM	<0.0300	<0.0300	<0.0300
	3/27/2001	<0.0300	0.1050	0.1430	NM	NM	<0.0300	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	<0.0300	<0.0300
	10/3/2001	<0.0300	<0.0300	0.1060	NM	NM	<0.0300	<0.0300	NM
	4/23/2002	<0.0300	<0.0300	0.0920	NM	NM	<0.0300	<0.0300	NM
	4/30/2002	NM	0.2060						
	10/3/2002	<0.0300	<0.0300	<0.0300	NM	NM	<0.0300	<0.0300	<0.0300
	4/17/2003	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/15/2003	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	4/15/2004	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/4/2004	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	4/5/2005	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/10/2005	NM	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	4/18/2006	NM	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/11/2006	NM	NM	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
Nitrogen, Ammonia - mg/L HAL - 30 mg/L	11/8/1996	NM	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	2/27/1997	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	5/12/1997	NM	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	7/23/1997	NM	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	10/16/1997	NM	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	4/7/1998	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	10/16/1998	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	4/16/1999	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000	<0.2000	<0.2000
	10/7/1999	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000	NM	<0.2000
	4/5/2000	<1.00	<1.00	<1.00	NM	NM	<1.00	NM	<1.00
	10/12/2000	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	<1.00
	3/27/2001	<1.00	<1.00	<1.00	NM	NM	<1.00	NM	NM
	4/6/2001	NM	NM	NM	NM	NM	NM	<1.00	<1.00
	10/3/2001	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	NM
	4/23/2002	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	NM
	4/30/2002	NM	NM	NM	NM	NM	NM	<1.00	
	10/3/2002	<1.00	<1.00	<1.00	NM	NM	<1.00	<1.00	<1.00
	4/17/2003	<0.2000	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	10/15/2003	<0.2000	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	4/15/2004	<0.2000	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	10/4/2004	0.3300	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	4/5/2005	<0.2000	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	10/10/2005	NM	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	4/18/2006	NM	<0.2000	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000
	10/11/2006	NM	NM	<0.2000	NM	NM	<0.2000	<0.2000	<0.2000



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Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
pH - S.U.	11/8/1996	NM	NM	NM	7.89	8.33	7.85	8.25	8.32
	2/27/1997	6.89	NM	NM	6.78	8.15	7.45	7.81	7.23
	5/12/1997	NM	NM	NM	6.82	6.52	6.47	7.40	7.45
	7/23/1997	NM	NM	NM	6.77	7.09	6.70	7.10	7.30
	10/16/1997	NM	NM	NM	7.51	7.26	7.60	7.93	7.96
	4/7/1998	7.32	NM	NM	7.60	7.35	7.78	8.07	8.21
	10/16/1998	7.57	NM	NM	7.64	7.13	7.64	8.03	8.11
	4/16/1999	7.88	NM	NM	7.91	7.36	7.84	7.35	7.22
	10/7/1999	7.10	NM	NM	7.08	6.96	6.90	NM	7.38
	4/5/2000	6.81	6.93	6.63	NM	NM	6.94	NM	7.11
	10/12/2000	6.43	6.95	6.60	NM	NM	6.50	6.37	6.40
	3/27/2001	7.37	7.85	7.91	NM	NM	7.87	7.40	7.53
	10/3/2001	8.18	7.86	8.03	NM	NM	8.64	7.78	NM
	4/23/2002	6.97	7.34	7.61	NM	NM	7.08	6.99	6.67
	10/3/2002	6.83	7.32	7.38	NM	NM	7.32	7.19	7.36
	4/17/2003	6.75	6.89	6.61	NM	NM	7.21	6.88	6.98
	10/15/2003	6.73	6.78	6.93	NM	NM	7.04	6.98	7.13
	4/15/2004	7.26	7.35	7.19	NM	NM	7.38	7.37	7.38
	10/4/2004	7.41	7.42	7.32	NM	NM	7.44	7.49	7.55
	4/5/2005	7.57	7.70	7.50	NM	NM	7.67	7.54	7.60
	10/10/2005	7.50	7.51	7.15	NM	NM	7.30	7.31	7.41
	4/18/2006	NM	7.23	7.12	NM	NM	7.50	7.13	7.30
	10/11/2006	NM	NM	7.50	NM	NM	7.37	7.62	7.47
Specific Conductance - umhos/cm	11/8/1996	NM	NM	NM	660	660	900	760	790
	5/12/1997	NM	NM	NM	710	670	800	670	780
	7/23/1997	NM	NM	NM	2,510	1,140	2,090	2,460	2,070
	10/16/1997	NM	NM	NM	810	790	960	1,010	1,030
	4/7/1998	880	NM	NM	790	850	1,040	1,070	1,130
	10/16/1998	780	NM	NM	880	700	820	930	1,080
	4/16/1999	1,010	NM	NM	920	760	790	710	860
	10/7/1999	480	NM	NM	370	410	470	NM	460
	4/5/2000	1,630	1,060	820	NM	NM	640	NM	920
	10/12/2000	750	1,050	850	NM	NM	680	640	690
	3/27/2001	1,640	1,920	1,250	NM	NM	1,530	651	765
	4/6/2001	NM	NM	NM	NM	NM	NM	651	765
	10/3/2001	790	1,800	830	NM	NM	920	1,010	NM
	4/23/2002	810	1,287	631	NM	NM	658	686	697
	10/3/2002	688	988	526	NM	NM	576	582	599
	4/17/2003	845	1,209	711	NM	NM	621	685	780
	10/15/2003	513	872	493	NM	NM	521	574	541
	4/15/2004	766	1,296	733	NM	NM	755	824	823
	10/4/2004	1,338	815	515	NM	NM	1,271	<4,000	2,528
	4/5/2005	795	1,320	740	NM	NM	803	807	834
	10/10/2005	1,300	912	817	NM	NM	1,304	<4,000	2,107
	4/18/2006	NM	1,253	686	NM	NM	682	741	769
	10/11/2006	NM	NM	742	NM	NM	752	784	819

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Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Total Organic Halogens - mg/L	11/8/1996	NM	NM	NM	<0.0100	<0.0100	<0.0100	<0.0100	0.0170
	10/16/1997	NM	NM	NM	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
	4/7/1998	<0.0100	NM						
	10/16/1998	<0.0100	NM	NM	0.0160	<0.0100	0.0180	0.0010	0.0130
	4/16/1999	<0.0100	NM						
	10/7/1999	<0.0100	NM	NM	<0.0100	0.0100	0.0100	NM	<0.0100
	10/12/2000	0.0200	<0.0100	0.0300	NM	NM	<0.0100	0.0200	0.0200
	10/3/2001	<0.0100	<0.0100	0.0110	NM	NM	<0.0100	0.0100	NM
	10/3/2002	0.0700	<0.0100	0.0260	NM	NM	0.0200	0.1350	0.1430
	10/15/2003	<0.0100	<0.0100	<0.0100	NM	NM	<0.0100	0.0130	<0.0100
	10/4/2004	<0.0100	<0.0100	<0.0100	NM	NM	<0.0100	<0.0100	<0.0100
	10/10/2005	NM	<0.0100	<0.0100	NM	NM	<0.0100	<0.0100	<0.0100
	10/11/2006	NM	NM	0.0114	NM	NM	0.0140	0.0213	<0.0100
Total Phenols - mg/L HAL - 2 mg/L	11/8/1996	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	10/16/1997	NM	NM	NM	0.0500	<0.0200	<0.0200	<0.0200	<0.0200
	4/7/1998	<0.0200	NM						
	10/16/1998	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	4/16/1999	<0.0200	NM						
	10/7/1999	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200	NM	<0.0200
	10/12/2000	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/3/2001	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	NM
	10/3/2002	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000
	10/15/2003	<0.0200	<0.0200	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200
	10/4/2004	<0.0200	<0.0200	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200
	10/10/2005	NM	<0.0200	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200
	10/11/2006	NM	NM	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200
Benzene - ug/L MCL - 5 ug/L NRL - 1 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<0.5	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	5/12/1997	NM	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	7/23/1997	NM	NM	NM	<0.5	<0.5	<0.5	<0.5	<0.5
	4/7/1998	<0.5	NM						
	10/16/1998	<0.5	NM						
	4/16/1999	<0.5	NM						
	10/7/1999	<0.5	NM						
1,2-Dichloroethane - ug/L MCL - 5 ug/L NRL - 0.4 ug/L	11/8/1996	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	2/27/1997	<0.4	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	5/12/1997	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	7/23/1997	NM	NM	NM	<0.4	<0.4	<0.4	<0.4	<0.4
	4/7/1998	<0.4	NM						
	10/16/1998	<0.4	NM						
	4/16/1999	<0.4	NM						
	10/7/1999	<0.4	NM						
Trichloroethylene - ug/L MCL - 5 ug/L NRL - 3 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM						
	10/16/1998	<1.0	NM						
	4/16/1999	<1.0	NM						
	10/7/1999	<1.0	NM						

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Council Bluffs Construction and Demolition Landfill - 78-SDP-04-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
1,1-Dichloroethene - ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<2.0	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	5/12/1997	NM	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	7/23/1997	NM	NM	NM	<2.0	<2.0	<2.0	<2.0	<2.0
	4/7/1998	<2.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<2.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<2.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<2.0	NM	NM	NM	NM	NM	NM	NM
1,1,1-Trichloroethane - ug/L MCL - 200 ug/L HAL - 200 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
1,4-Dichlorobenzene - ug/L MCL - 75 ug/L HAL - 75 ug/L	11/8/1996	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	2/27/1997	<1.0	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	5/12/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	7/23/1997	NM	NM	NM	<1.0	<1.0	<1.0	<1.0	<1.0
	4/7/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<1.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<1.0	NM	NM	NM	NM	NM	NM	NM
Carbon Tetrachloride - ug/L MCL - 5 ug/L NRL - 0.3 ug/L	11/8/1996	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	2/27/1997	<0.3	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	5/12/1997	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	7/23/1997	NM	NM	NM	<0.3	<0.3	<0.3	<0.3	<0.3
	4/7/1998	<0.3	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.3	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.3	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.3	NM	NM	NM	NM	NM	NM	NM
Arsenic, Dissolved - mg/L MCL - 0.01 mg/L	11/8/1996	NM	NM	NM	<0.0010	<0.0010	<0.0010	<0.0010	0.0017
	2/27/1997	<0.0010	NM	NM	0.0021	<0.0010	<0.0010	<0.0010	<0.0010
	5/12/1997	NM	NM	NM	0.0016	0.0014	<0.0010	0.0021	<0.0010
	7/23/1997	NM	NM	NM	<0.0010	<0.0010	<0.0010	0.0034	<0.0010
	10/16/1997	NM	NM	NM	0.0010	NM	0.0010	NM	NM
	4/7/1998	0.0014	NM	NM	<0.0010	<0.0010	NM	<0.0010	NM
	10/16/1998	<0.0010	NM	NM	<0.0010	<0.0010	NM	<0.0010	NM
	4/16/1999	<0.0010	NM	NM	<0.0010	<0.0010	NM	<0.0010	NM
	10/7/1999	0.0012	NM	NM	NM	NM	NM	NM	NM
	4/5/2000	0.0020	NM	NM	NM	NM	NM	NM	NM
	10/12/2000	0.0040	NM	NM	NM	NM	NM	NM	NM
	3/27/2001	0.0050	NM	NM	NM	NM	NM	NM	NM
	10/3/2001	0.0030	NM	NM	NM	NM	NM	NM	NM
	4/23/2002	0.0020	NM	NM	NM	NM	NM	NM	NM
	10/3/2002	0.0050	NM	NM	NM	NM	NM	NM	NM
	4/17/2003	0.0018	<0.0010	NM	NM	NM	NM	NM	NM
	10/15/2003	0.0024	<0.0010	NM	NM	NM	NM	NM	NM
	4/15/2004	0.0025	<0.0010	NM	NM	NM	NM	NM	NM
	10/4/2004	0.0016	0.0103	NM	NM	NM	NM	NM	NM
	4/5/2005	0.0015	<0.0010	NM	NM	NM	NM	NM	NM
	10/10/2005	NM	<0.0010	NM	NM	NM	NM	NM	NM
	4/18/2006	NM	<0.0010	NM	NM	NM	NM	NM	NM



## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-04-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Barium, Dissolved - mg/L MCL - 2 mg/L HAL - 2 mg/L	11/8/1996	NM	NM	NM	0.4230	0.2720	0.2360	0.3620	0.1680
	2/27/1997	0.3390	NM	NM	0.3010	0.2550	0.2160	0.3850	0.1390
	5/12/1997	NM	NM	NM	0.2610	0.2380	0.2110	0.1450	0.1510
	7/23/1997	NM	NM	NM	0.2650	0.2420	0.2040	0.1540	0.1440
	4/7/1998	0.2740	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	0.1830	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	0.2800	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	0.7270	NM	NM	NM	NM	NM	NM	NM
Cadmium, Dissolved - mg/L MCL - 0.005 mg/L HAL - 0.005 mg/L	11/8/1996	NM	NM	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	2/27/1997	<0.0005	NM	NM	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	5/12/1997	NM	NM	NM	<0.0005	<0.0005	<0.0005	0.0008	<0.0005
	7/23/1997	NM	NM	NM	<0.0005	<0.0005	0.0027	<0.0005	<0.0005
	4/7/1998	<0.0005	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.0005	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	0.0007	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.0005	NM	NM	NM	NM	NM	NM	NM
Chromium, Dissolved - mg/L MCL - 0.1 mg/L	11/8/1996	NM	NM	NM	<0.0020	<0.0020	0.0022	0.0068	0.0075
	2/27/1997	<0.0020	NM	NM	0.0042	0.0073	0.0037	0.0081	0.0078
	5/12/1997	NM	NM	NM	0.0026	0.0069	0.0038	<0.0020	0.0069
	7/23/1997	NM	NM	NM	0.0023	0.0065	0.0030	<0.0020	0.0060
	4/7/1998	<0.0020	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	0.0032	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.0020	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.0020	NM	NM	NM	NM	NM	NM	NM
Copper, Dissolved - mg/L MCL - 1.3 mg/L	11/8/1996	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	2/27/1997	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	5/12/1997	NM	NM	NM	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
	7/23/1997	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	4/7/1998	<0.0200	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.0200	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.0200	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.0200	NM	NM	NM	NM	NM	NM	NM
Lead, Dissolved - mg/L MCL - 0.015 mg/L	11/8/1996	NM	NM	NM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	2/27/1997	<0.0050	NM	NM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	5/12/1997	NM	NM	NM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	7/23/1997	NM	NM	NM	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040
	4/7/1998	<0.0040	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.0040	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.0040	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.0040	NM	NM	NM	NM	NM	NM	NM
Magnesium, Dissolved - mg/L	11/8/1996	NM	NM	NM	64.0	22.0	38.0	22.0	29.0
	2/27/1997	45.0	NM	NM	75.0	24.0	39.0	25.0	28.0
	5/12/1997	NM	NM	NM	71.0	23.0	38.0	21.0	29.0
	7/23/1997	NM	NM	NM	69.0	22.0	37.0	22.0	27.0
	4/7/1998	34.0	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	30.0	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	42.0	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	56.0	NM	NM	NM	NM	NM	NM	NM
Mercury, Dissolved - mg/L MCL - 0.002 mg/L HAL - 0.002 mg/L	11/8/1996	NM	NM	NM	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	2/27/1997	<0.0002	NM	NM	<0.0002	0.0007	0.0007	0.0008	0.0008
	5/12/1997	NM	NM	NM	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	7/23/1997	NM	NM	NM	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	4/7/1998	<0.0002	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.0002	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.0002	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	<0.0002	NM	NM	NM	NM	NM	NM	NM



## Summary of Groundwater Chemistry

Council Bluffs Construction and Demolition Landfill - 78-SDP-04-89

Parameter	Date	MW-2	MW-3	MW-4	MW-5	MW-7	MW-9	MW-10	MW-11
		DN1	UP1	UP2	UP1	UP2	DN1	DN2	DN1
Zinc, Dissolved - mg/L HAL - 2 mg/L	11/8/1996	NM	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	2/27/1997	<0.0200	NM	NM	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200
	5/12/1997	NM	NM	NM	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
	7/23/1997	NM	NM	NM	0.0710	<0.0200	<0.0200	<0.0200	<0.0200
	4/7/1998	<0.0200	NM	NM	NM	NM	NM	NM	NM
	10/16/1998	<0.0200	NM	NM	NM	NM	NM	NM	NM
	4/16/1999	<0.0200	NM	NM	NM	NM	NM	NM	NM
	10/7/1999	0.1450	NM	NM	NM	NM	NM	NM	NM

**Notes:**

NM - Indicates parameter was not measured

< - Indicates less than the Method Detection Limit (MDL)

ug/L - Indicates micrograms per liter, equivalent to parts per billion at low concentrations

mg/L - Indicates milligrams per liter, equivalent to parts per million at low concentrations

USEPA HAL - Indicates United States Environmental Protection Agency Health Advisory Level

USEPA NRL - Indicates United States Environmental Protection Agency Negligible Risk Level for Carcinogens

USEPA MCL - Indicates United States Environmental Protection Agency Maximum Contaminant Level

Sampling performed over multiple dates is recorded on the first date sampled. Refer to field forms for exact sample date.

**APPENDIX C**  
**FALL ANALYTICAL DATA**

October 30, 2006

Client:

BARKER, LEMAR & ASSOCIATES  
1801 Industrial Circle  
West Des Moines, IA 50265

Work Order: CPJ0832  
Project Name: Anderson E&W-Council Bluffs C&D Landfill  
Project Number: ANDEX 06001

Attn: Yuta Naganuma

Date Received: 10/13/06

An executed copy of the chain of custody is also included as an addendum to this report

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(800)750-2401

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
MW-4	CPJ0832-01	10/11/06 15:35
MW-9	CPJ0832-02	10/11/06 13:30
MW-10	CPJ0832-03	10/11/06 14:00
MW-11	CPJ0832-04	10/11/06 14:45

Samples were received into laboratory at a temperature of 2 °C.

Most environmental analytical testing methods require a sample temperature of 4 degrees C +/- 2 degrees C for preservation of the sample constituents prior to analysis. If sample temperatures are outside of this temperature range at the time of sample receipt, results may be impacted. Please refer to the Temperature and Sample Receipt form that is included with this report for additional information regarding the condition of samples at the time of receipt by the laboratory.

The reported results were obtained in compliance with the 2003 NELAC standards unless otherwise noted.

Iowa Certification Number: 007

*Reproduction of this analytical report is permitted only in its entirety. This report shall not be reproduced except in full without the written approval of the laboratory.*

*TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample analyzed.*

Approved By:



TestAmerica - Cedar Falls, IA  
Linda Cmelik  
Project Coordinator

BARKER, LEMAR & ASSOCIATES  
 1801 Industrial Circle  
 West Des Moines, IA 50265  
 Yuta Naganuma

Work Order: CPJ0832  
 Project: Anderson E&W-Council Bluffs C&D Landfill  
 Project Number: ANDEX 06001

Received: 10/13/06  
 Reported: 10/30/06 16:33

## ANALYTICAL REPORT

Analyte	Sample Result	Data Qualifiers	Quan. Units	Limit Dilution Factor	Date Analyzed	Seq/ Analyst	Batch	Method
<b>Sample ID: CPJ0832-01 (MW-4 - Ground Water)</b>								
General Chemistry Parameters								
Ammonia as N	<0.200		mg/L	0.200	1	10/23/06 14:18	lbb	6101140 EPA 350.1
Chemical Oxygen Demand	8.60		mg/L	5.00	1	10/26/06 11:22	jcf	6101397 SM 5220D
Chloride	5.34		mg/L	5.00	1	10/24/06 09:04	lbb	6101180 SM 4500Cl E
Phenol	<0.0200		mg/L	0.0200	0.96	10/26/06 11:05	mdk	6101337 EPA 420.2
Total Organic Halides	0.0114		mg/L Cl-	0.0100	1	10/19/06 14:20	jmh	6101263 SW 9020
Dissolved Metals by SW 846 Series Methods								
Iron	<0.100		mg/L	0.100	1	10/28/06 18:21	llw	6101463 SW 6010B
<b>Sample ID: CPJ0832-02 (MW-9 - Ground Water)</b>								
General Chemistry Parameters								
Ammonia as N	<0.200		mg/L	0.200	1	10/23/06 14:19	lbb	6101140 EPA 350.1
Chemical Oxygen Demand	6.40		mg/L	5.00	1	10/26/06 11:22	jcf	6101397 SM 5220D
Chloride	9.21		mg/L	5.00	1	10/24/06 09:04	lbb	6101180 SM 4500Cl E
Phenol	<0.0200		mg/L	0.0200	0.94	10/26/06 11:11	mdk	6101337 EPA 420.2
Total Organic Halides	0.0140		mg/L Cl-	0.0100	1	10/19/06 14:20	jmh	6101263 SW 9020
Dissolved Metals by SW 846 Series Methods								
Iron	<0.100		mg/L	0.100	1	10/28/06 18:26	llw	6101463 SW 6010B
<b>Sample ID: CPJ0832-03 (MW-10 - Ground Water)</b>								
General Chemistry Parameters								
Ammonia as N	<0.200		mg/L	0.200	1	10/23/06 14:19	lbb	6101140 EPA 350.1
Chemical Oxygen Demand	<5.00		mg/L	5.00	1	10/26/06 11:22	jcf	6101397 SM 5220D
Chloride	35.2		mg/L	5.00	1	10/24/06 09:05	lbb	6101180 SM 4500Cl E
Phenol	<0.0200		mg/L	0.0200	0.96	10/26/06 11:11	mdk	6101337 EPA 420.2
Total Organic Halides	0.0213		mg/L Cl-	0.0100	1	10/20/06 14:20	sas	6101263 SW 9020
Dissolved Metals by SW 846 Series Methods								
Iron	<0.100		mg/L	0.100	1	10/28/06 18:31	llw	6101463 SW 6010B
<b>Sample ID: CPJ0832-04 (MW-11 - Ground Water)</b>								
General Chemistry Parameters								
Ammonia as N	<0.200		mg/L	0.200	1	10/27/06 10:16	lbb	6101409 EPA 350.1
Chemical Oxygen Demand	<5.00		mg/L	5.00	1	10/26/06 11:22	jcf	6101397 SM 5220D
Chloride	8.87		mg/L	5.00	1	10/24/06 09:05	lbb	6101180 SM 4500Cl E
Phenol	<0.0200		mg/L	0.0200	0.96	10/26/06 11:12	mdk	6101337 EPA 420.2
Total Organic Halides	<0.0100		mg/L Cl-	0.0100	1	10/20/06 14:20	jmh	6101263 SW 9020
Dissolved Metals by SW 846 Series Methods								
Iron	<0.100		mg/L	0.100	1	10/28/06 18:36	llw	6101463 SW 6010B

BARKER, LEMAR & ASSOCIATES  
1801 Industrial Circle  
West Des Moines, IA 50265  
Yuta Naganuma

Work Order: CPJ0832

Received: 10/13/06

Reported: 10/30/06 16:33

Project: Anderson E&W-Council Bluffs C&D Landfill  
Project Number: ANDEX 06001

## LABORATORY BLANK QC DATA

Analyte	Seq/ Batch	Source	Spike Result	Level	Units	MDL	MRL	Dup Result	% Result	Dup REC %	% REC Limits	RPD	RPD Limit	Q
<b>General Chemistry Parameters</b>														
Ammonia as N	6101140				mg/L	N/A	0.200	<0.200						
Chloride	6101180				mg/L	N/A	5.00	<5.00						
Total Organic Halides	6101263				mg/L Cl-	N/A	0.0100	<0.0100						
Phenol	6101337				mg/L	N/A	0.0200	<0.0200						
Chemical Oxygen Demand	6101397				mg/L	N/A	5.00	<5.00						
Ammonia as N	6101409				mg/L	N/A	0.200	<0.200						
<b>Dissolved Metals by SW 846 Series Methods</b>														
Iron	6101463				mg/L	N/A	0.100	<0.100						

BARKER, LEMAR & ASSOCIATES  
 1801 Industrial Circle  
 West Des Moines, IA 50265  
 Yuta Naganuma

Work Order: CPJ0832

Received: 10/13/06  
 Reported: 10/30/06 16:33

Project: Anderson E&W-Council Bluffs C&D Landfill  
 Project Number: ANDEX 06001

## LABORATORY DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	% REC	Dup % REC	% REC Limits	RPD	RPD Limit	Q
<b>Dissolved Metals by SW 846 Series Methods</b>													
QC Source Sample: CPJ0791-12													
Iron	6101463	4.31		mg/L	N/A	0.100	4.35				1	15	
QC Source Sample: CPJ0884-01	6101463	1.66		mg/L	N/A	0.100	1.64				1	15	

BARKER, LEMAR & ASSOCIATES  
 1801 Industrial Circle  
 West Des Moines, IA 50265  
 Yuta Naganuma

Work Order: CPJ0832

Received: 10/13/06  
 Reported: 10/30/06 16:33

Project: Anderson E&W-Council Bluffs C&D Landfill  
 Project Number: ANDEX 06001

## LCS/LCS DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Dup Result	% Result	Dup REC %	% REC Limits	RPD	RPD Limit	Q
<b>General Chemistry Parameters</b>													
Ammonia as N	6101140	9.43	mg/L	N/A	N/A	9.88	105			90-110			
Chloride	6101180	99.1	mg/L	N/A	5.00	107	108			90-110			
Total Organic Halides	6101263	0.100	mg/L Cl-	N/A	0.0100	0.0973	97			70-130			
Phenol	6101337	0.100	mg/L	N/A	0.0200	0.104	104			90-110			
Chemical Oxygen Demand	6101397	250	mg/L	N/A	10.0	247	99			90-110			
Ammonia as N	6101409	9.43	mg/L	N/A	N/A	9.66	102			90-110			
<b>Dissolved Metals by SW 846 Series Methods</b>													
Iron	6101463	10.0	ug/mL	N/A	N/A	9.83	98			85-115			

BARKER, LEMAR & ASSOCIATES  
 1801 Industrial Circle  
 West Des Moines, IA 50265  
 Yuta Nagamura

Work Order: CPJ0832

Received: 10/13/06

Reported: 10/30/06 16:33

Project: Anderson E&W-Council Bluffs C&D Landfill  
 Project Number: ANDEX 06001

## MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Dup Result	% REC	Dup Result	% REC	RPD	RPD Limit	Q	
<b>General Chemistry Parameters</b>														
QC Source Sample: CPJ0791-01														
Ammonia as N	6101140	0.0973	10.0	mg/L	N/A	0.200	8.97	9.08	89	90	90-110	1	20	M1
QC Source Sample: CPJ0795-01	6101180	229	25.0	mg/L	N/A	5.00	241	241	48	48	90-110	0	20	M1
Chloride	6101263	0.0114	0.100	mg/L Cl <sup>-</sup>	N/A	0.0100	0.107	0.0962	96	85	75-125	11	20	
QC Source Sample: CPJ0832-01	6101337	<0.020	0.100	mg/L	N/A	0.0200	0.101	0.100	101	100	90-110	1	15	
Total Organic Halides	6101397	2.90	50.0	mg/L	N/A	5.00	58.5	54.1	111	102	75-125	8	20	
QC Source Sample: CPJ0832-01	6101409	<0.20	10.0	mg/L	N/A	0.200	10.0	9.96	100	100	90-110	0	20	
QC Source Sample: CPJ0791-14														
Chemical Oxygen Demand														
QC Source Sample: CPJ0832-04														
Ammonia as N														

BARKER, LEMAR & ASSOCIATES  
1801 Industrial Circle  
West Des Moines, IA 50265  
Yuta Naganuma

Work Order: CPJ0832

Received: 10/13/06  
Reported: 10/30/06 16:33

Project: Anderson E&W-Council Bluffs C&D Landfill  
Project Number: ANDEX 06001

## OTHER

Analyte	Seq/	Source	Spike	Units	MDL	MRL	Dup	%	Dup	% REC	RPD	Limit	Q
	Batch	Result	Level				Result	REC	%REC	Limits	RPD		
<b>Dissolved Metals by SW 846 Series Methods</b>													
QC Source Sample: CPJ0791-13													
Iron	6101463	4.32	1.92	ug/mL	N/A	N/A	6.13		94		75-125		
QC Source Sample: CPJ0884-02													
Iron	6101463	0.439	1.92	ug/mL	N/A	N/A	2.32		98		75-125		

BARKER, LEMAR & ASSOCIATES  
 1801 Industrial Circle  
 West Des Moines, IA 50265  
 Yuta Naganuma

Work Order: CPJ0832 Received: 10/13/06  
 Project: Anderson E&W-Council Bluffs C&D Landfill Reported: 10/30/06 16:33  
 Project Number: ANDEX 06001

## CERTIFICATION SUMMARY

TestAmerica - Cedar Falls, IA

Method	Matrix	Nelac	Iowa
EPA 350.1	Water - NonPotable	X	X
EPA 420.2	Water - NonPotable	X	X
SM 4500Cl E	Water - NonPotable	X	X
SM 5220D	Water - NonPotable	X	X
SW 6010B	Water - NonPotable	X	X
SW 9020	Water - NonPotable	X	X

*Any abnormalities or departures from sample acceptance policy shall be documented on the 'Sample Receipt and Temperature Log Form' and 'Sample Non-conformance Form' (if applicable) included with this report.*

*For information concerning certifications of this facility or another TestAmerica facility, please visit our website at [www.TestAmericanInc.com](http://www.TestAmericanInc.com)*

*Samples collected by TestAmerica Field Services personnel are noted on the Chain of Custody (COC) and are sampled in accordance with TA-CF SOP CF09-01.*

## DATA QUALIFIERS AND DEFINITIONS

M1      The MS and/or MSD were outside control limits.

## ADDITIONAL COMMENTS

704 Enterprise Drive  
Cedar Falls, Iowa 50613

Phone: 319-277-2401  
Fax: 615-742-7789  
or  
1-800-750-2401

SAMPLER:

SITE NAME: Anderson Excavating & Wrecking, Council Bluffs C&D Landfill

ADDRESS: 1801 Industrial Circle

CITY/STATE/ZIP: West Des Moines, IA 50265

TELEPHONE NUMBER: 515-258-8814

Fax: 515-258-0162

SAMPLED BY: (PRINT NAME)

SIGNATURE: \_\_\_\_\_

REPORT TO:

NAME: Yuta Nagurnama

COMPANY NAME: Barker Lemar Engineering Consultants

PROJECT NAME: Anderson Excavating & Wrecking, Council Bluffs C&D Landfill (October)

PROJECT NUMBER: ANDEX 06001

ADDRESS: 1801 Industrial Circle

West Des Moines, IA 50265

LABORATORY WORK ORDER NO.

Sample ID	Date Sampled	# of Contaminant Spotted	Composite	Field Filled	Eas	HCl (Blue & White Label)	NaOH (Orange & White Label)	H <sub>2</sub> SO <sub>4</sub> , Purple (Yellow & White Label)	NaOH (Black & White Label)	Drier (Speedy):	Groundwater	Wastewater	Drinking Water	SDI	DOE (Speedy):	T-ES	T-EE	T-EA	T-ES	T-EE	T-EA	FIR Results	Standard TAT	Laboratory Sample Number						
MW-4	3:35	S	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
MW-9	1:30																													
MW-10	2:00																													
MW-11	2:45																													
Received by:	Date:	Time:	Received by:	Date:	Time:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:	Temperature Upon Receipt:	Comments:
<i>Mark J. Scott</i>	6-3-0	1910	Test America	10-13-06	2:00																									

Signed Via:  
Printed for Use By:

*Mark J. Scott*  
10-13-06

10-13-06  
Test America  
1910  
Kunkle, Inc., date taken is 10/13/06, ref

# TestAmerica

ANALYTICAL TESTING CORPORATION

704 ENTERPRISE DRIVE • CEDAR FALLS, IA 50613 • 800-750-2401 • 319-277-2425 FAX

## Sample Receipt and Temperature Log Form

Client: Barker Lerner Engineering <sup>Consultants</sup> Project: \_\_\_\_\_

City: West Des Moines, IA

Date: 10-13-06 Receiver's Initials HDM Time (Delivered): 1910

### Temperature Record

Cooler ID# (if Applicable)

TACF 491

2 °C / On Ice

Temp Blank

Temperature out of compliance

Custody seals present?

Yes

Custody seals intact?

Yes  No

Non-Conformance report started

### Thermometer:

- IR - 905085 "A"
- IR - 809065 "B"
- CF07-03-T2
- 22126775

### Courier:

- |                                    |  |
|------------------------------------|--|
| <input type="checkbox"/> Airborne  | <input type="checkbox"/> Speedy                |
| <input type="checkbox"/> UPS       | <input checked="" type="checkbox"/> TA Courier |
| <input type="checkbox"/> Velocity  | <input type="checkbox"/> TA Field Svcs         |
| <input type="checkbox"/> FedEx     | <input type="checkbox"/> Client                |
| <input type="checkbox"/> DHL       |  |
| <input type="checkbox"/> US Postal | <input type="checkbox"/> Other                 |

### Exceptions Noted

Sample(s) not received in a cooler.

Samples(s) received same day of sampling.

Evidence of a chilling process

Temperature not taken:  
\_\_\_\_\_

Log-In by:

CW MF EM

OT \_\_\_\_\_

\*Refer to SOP CF01-01 for Temperature Criteria

# TestAmerica

ANALYTICAL TESTING CORPORATION

704 ENTERPRISE DRIVE • CEDAR FALLS, IA 50613 • 800-750-2401 • 319-277-2425 FAX

## Sample Receipt and Temperature Log Form

Client: Barker Lerner Engineering Co. Project: 100-15

City: West Des Moines, IA

Date: 10-13-06 Receiver's Initials NHM Time (Delivered): 1910

### Temperature Record

Cooler ID# (If Applicable)	<u>HA-99</u>
5 °C / Qn Ice	

### Thermometer:

- IR - 905085 "A"
- IR - 809065 "B"
- CF07-03-T2
- 22126775

Temp Blank

Temperature out of compliance

Custody seals present?

Yes

Custody seals intact?

Yes  No

Non-Conformance report started

### Courier:

<input type="checkbox"/> Airborne	<input type="checkbox"/> Speedy
<input type="checkbox"/> UPS	<input checked="" type="checkbox"/> TA Courier
<input type="checkbox"/> Velocity	<input type="checkbox"/> TA Field Svcs
<input type="checkbox"/> FedEx	<input type="checkbox"/> Client
<input type="checkbox"/> DHL	
<input type="checkbox"/> US Postal	<input type="checkbox"/> Other

### Exceptions Noted

<input type="checkbox"/>	Sample(s) not received in a cooler.
<input type="checkbox"/>	Samples(s) received same day of sampling.
<input type="checkbox"/>	Evidence of a chilling process
<input type="checkbox"/>	Temperature not taken: _____

Log-In by:

CW MF EM

OT \_\_\_\_\_

\*Refer to SOP CF01-01 for Temperature Criteria

**APPENDIX D**  
**EXCEEDANCE TABLES**

**Summary of Statistical Exceedances Groundwater  
Monitoring Wells by Well Cluster  
Council Bluffs Construction and Demolition Landfill - 78-SDP-04-89**

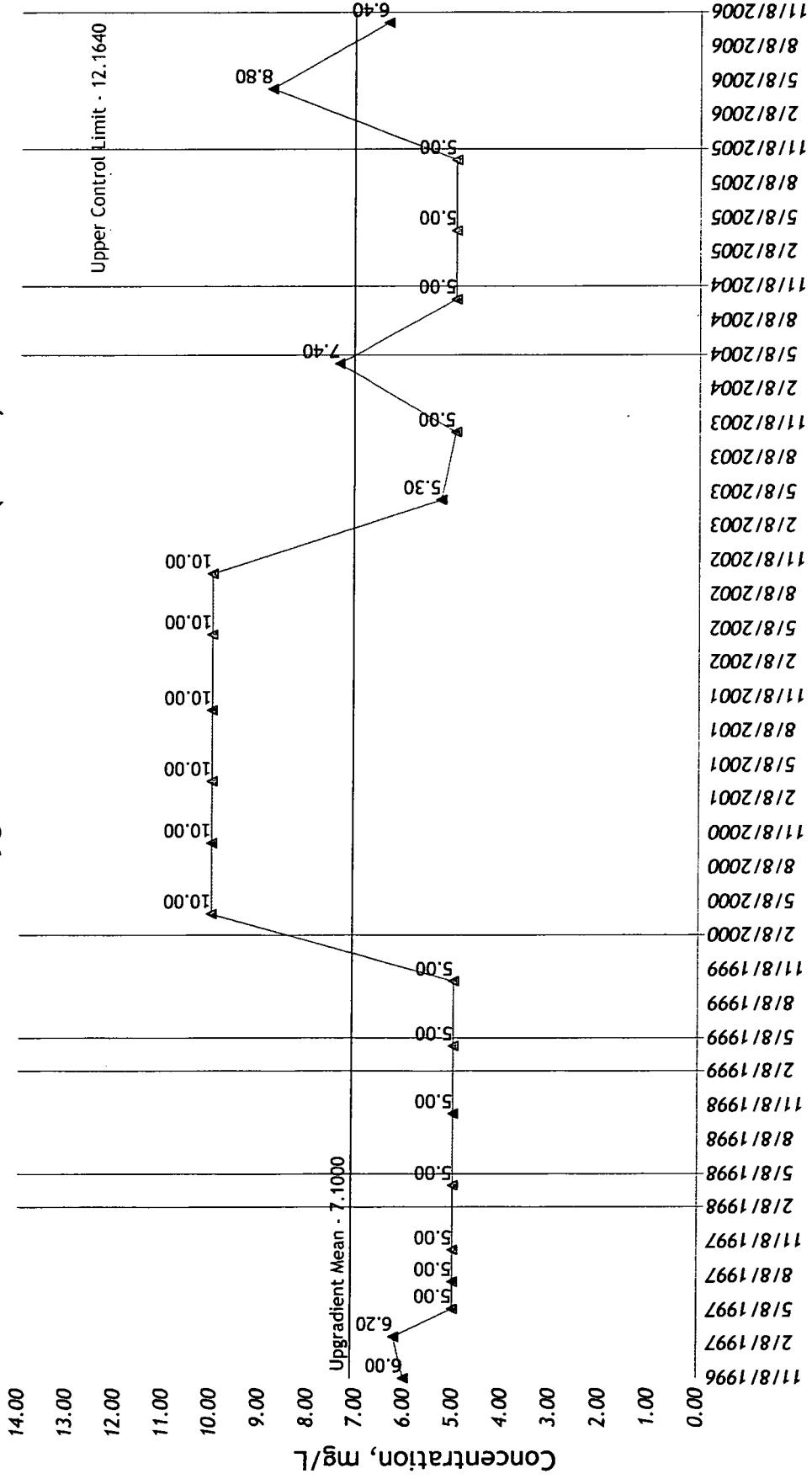
**MW-10 - Cluster DN2**

**Chloride**

Mean:	8.06	STD:	4.12	Exceedances Level:	16.296
<b>Current Action Levels:</b> None Established					
	4/18/2006		34.2 mg/L		
	10/11/2006		35.2 mg/L		

**APPENDIX E**  
**GRAPHS OF ANALYTICAL PARAMETERS/MONITORING POINT**

### Chemical Oxygen Demand Trends - (MW-9)

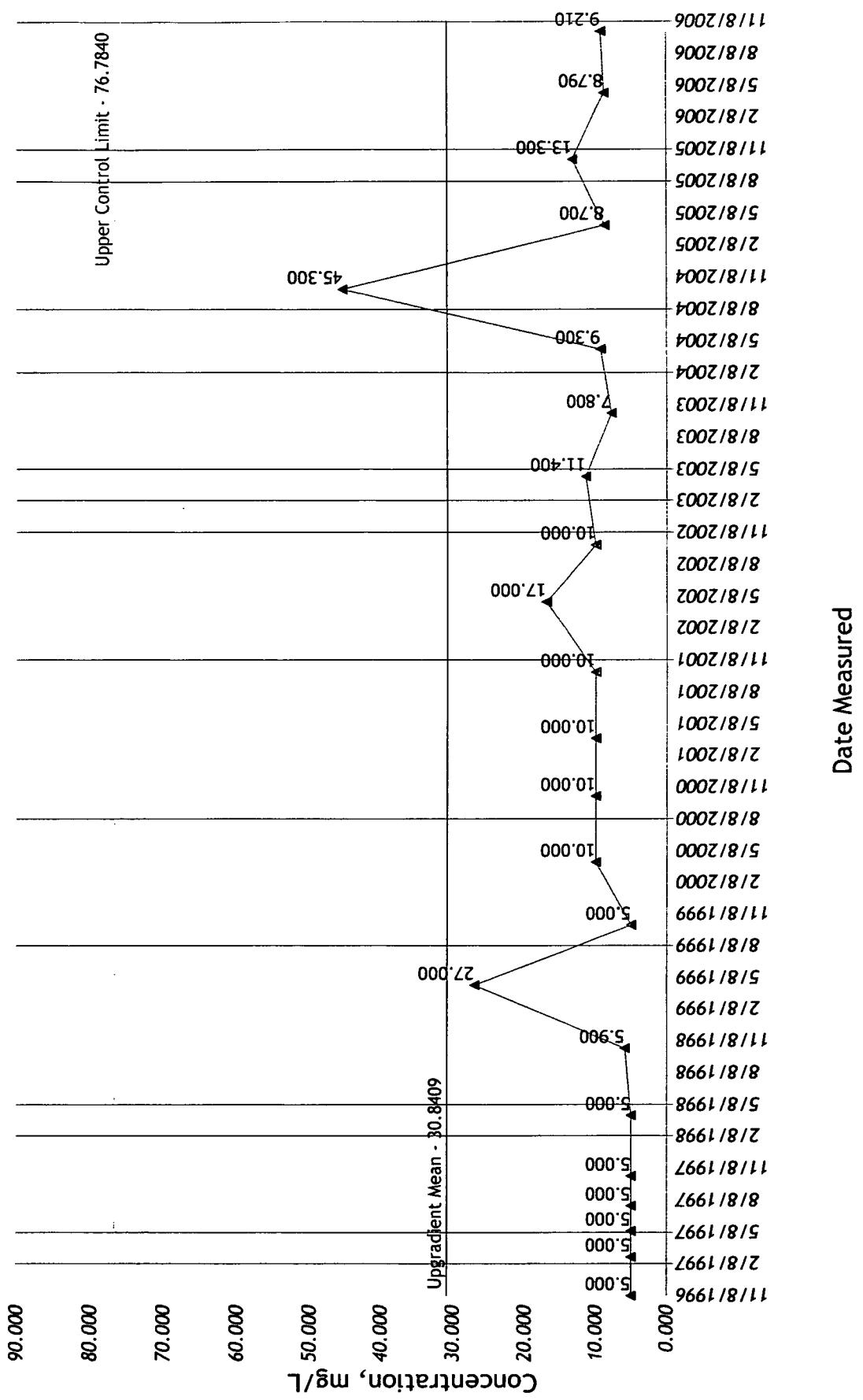


**1**

**Chemical Oxygen Demand  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89**

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11/9/2006 4:45:21 PM

### Chloride Trends - (MW-9)

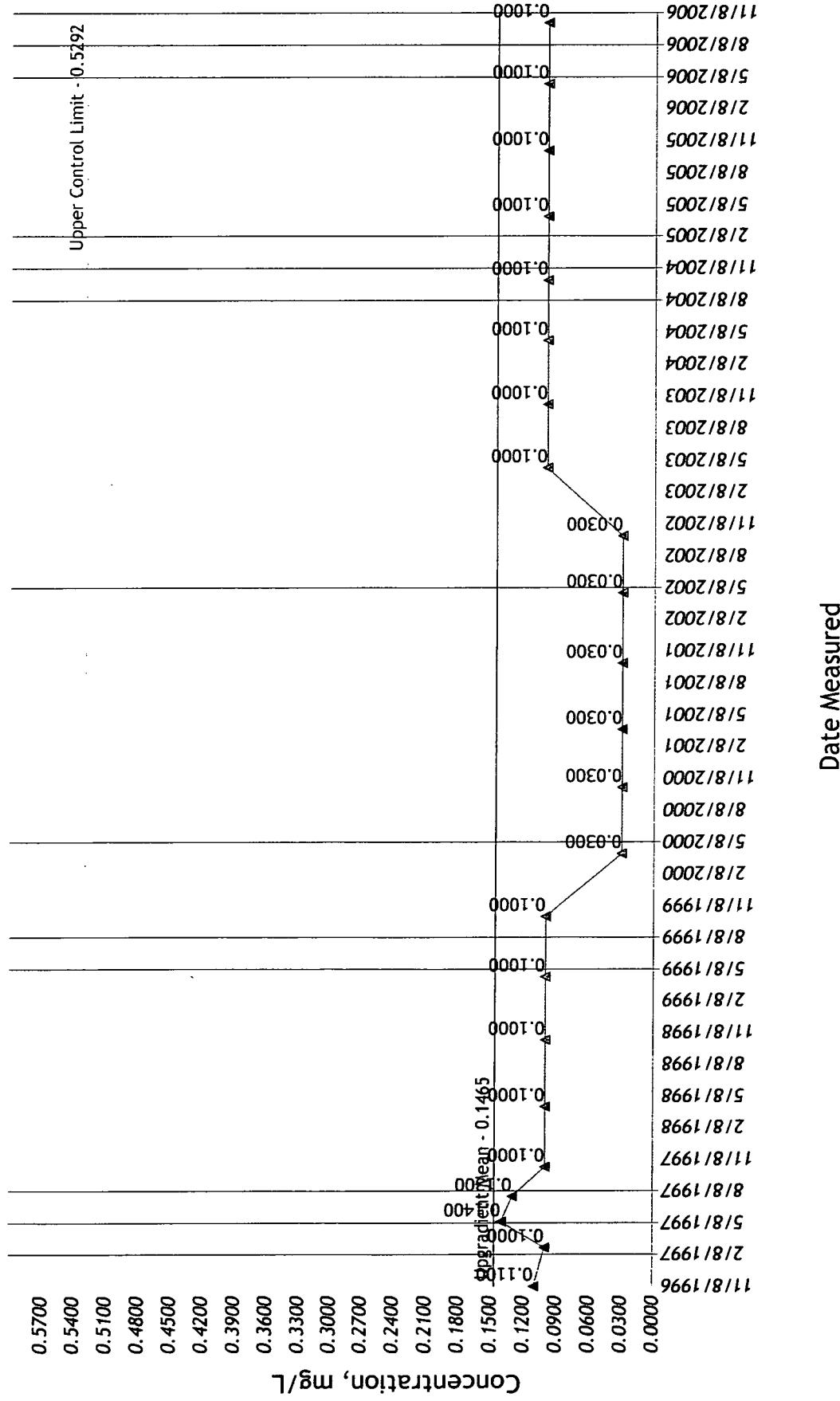


2

Chloride  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

06001  
11/9/2006 4:45:21 PM

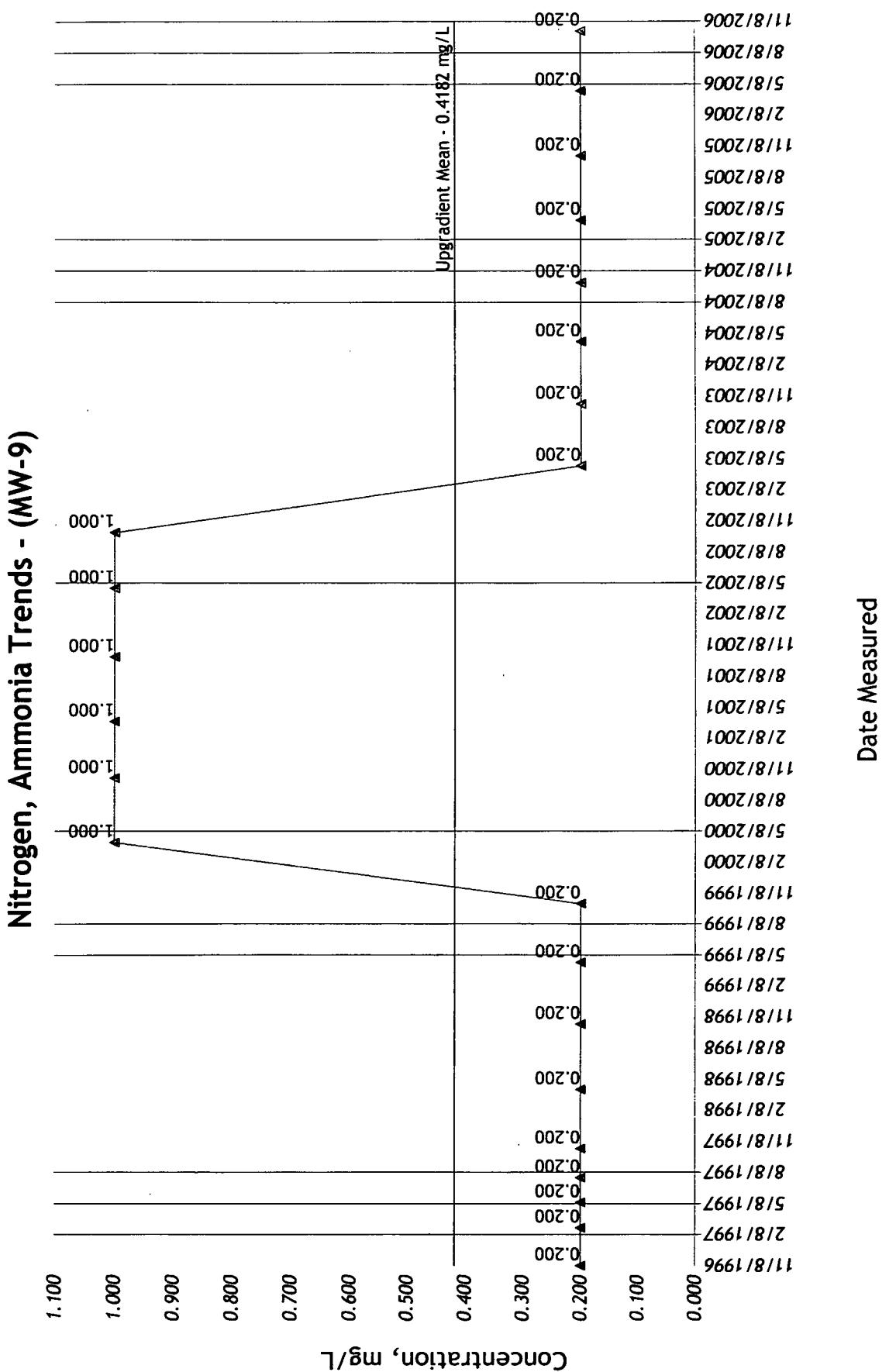
### Iron, Dissolved Trends - (MW-9)



3

**Iron, Dissolved  
Council Bluffs Construction and Demolition Landfill**  
78-SDP-04-89

06001  
11/9/2006 4:45:22 PM

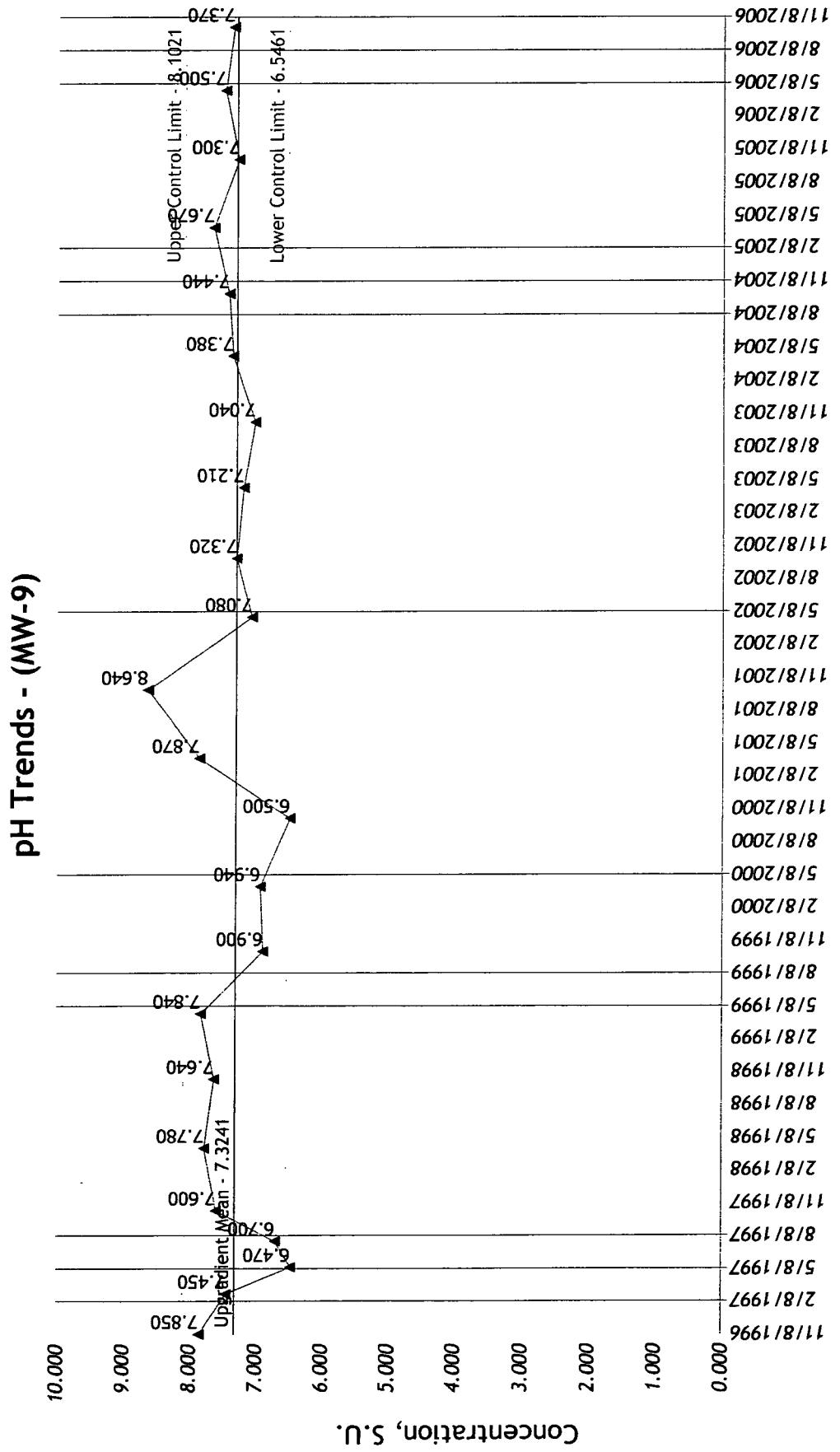


*Note: The upper control/limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.*

**4**

**Nitrogen, Ammonia  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89**

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**pH**

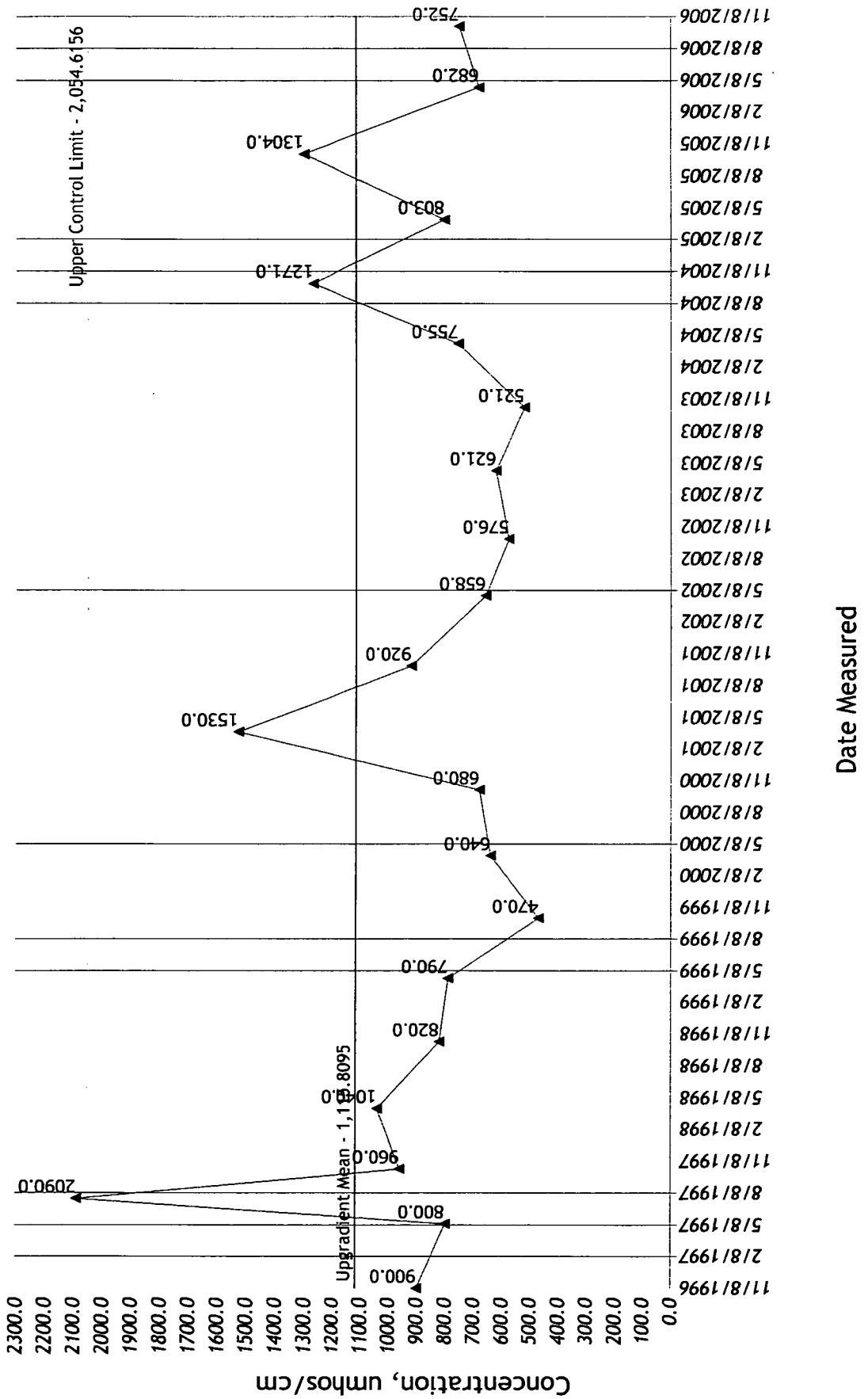
78-SDP-04-89

06001  
11/9/2006 4:45:22 PM

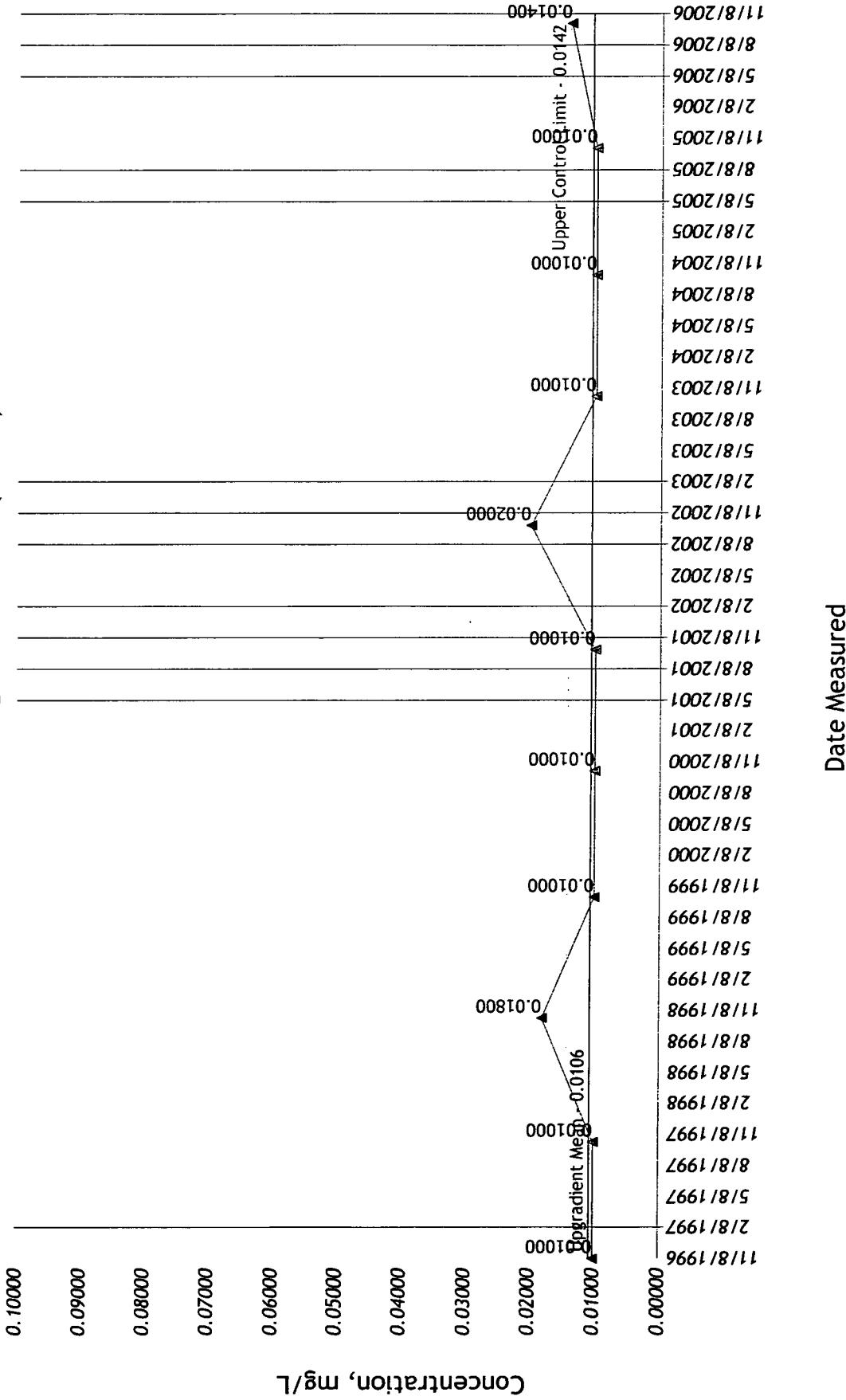
**Council Bluffs Construction and Demolition Landfill**

**5**

### Specific Conductance Trends - (MW-9)



### Total Organic Halogens Trends - (MW-9)



**Total Organic Halogens**

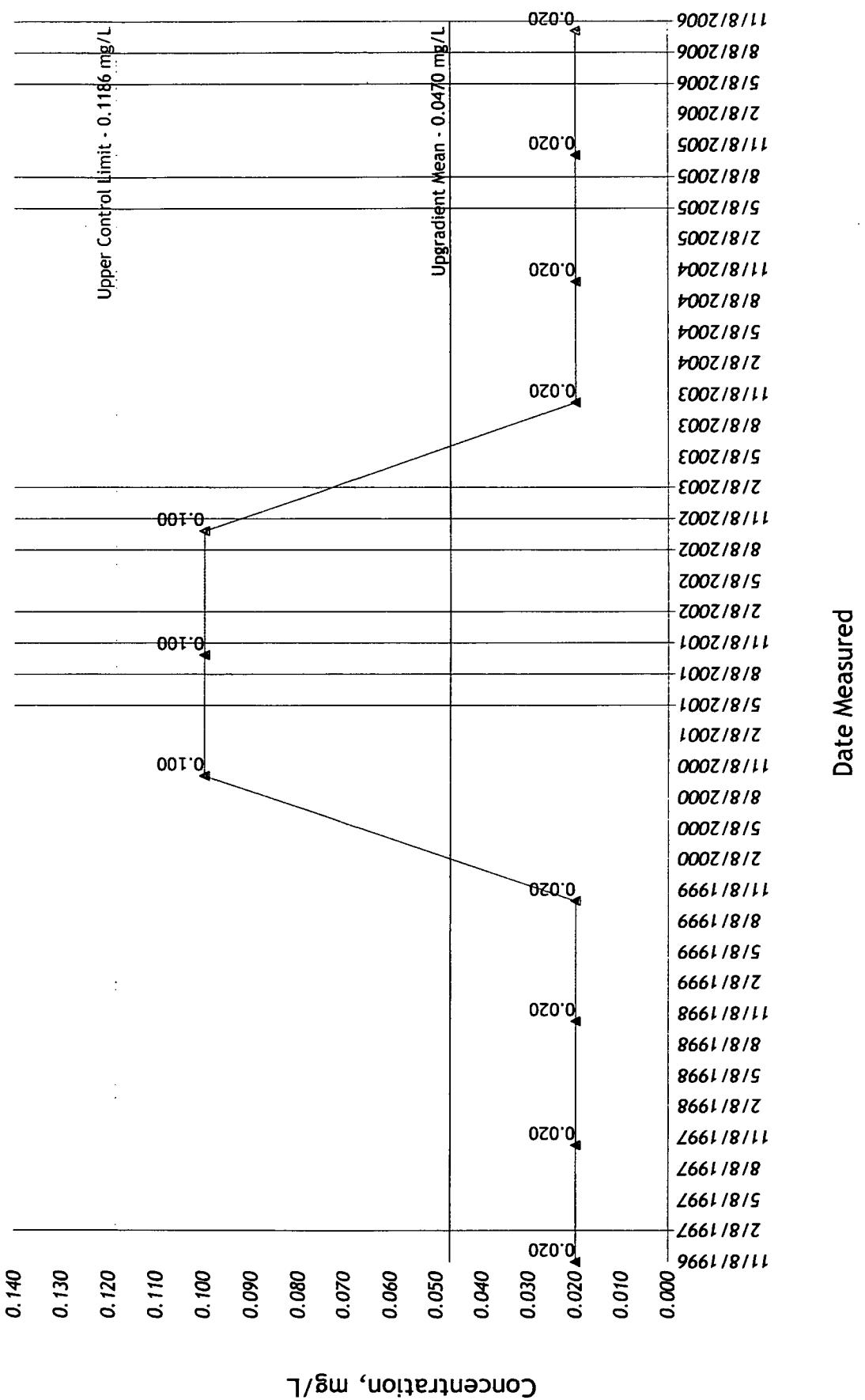
78-SDP-04-89

**Council Bluffs Construction and Demolition Landfill**

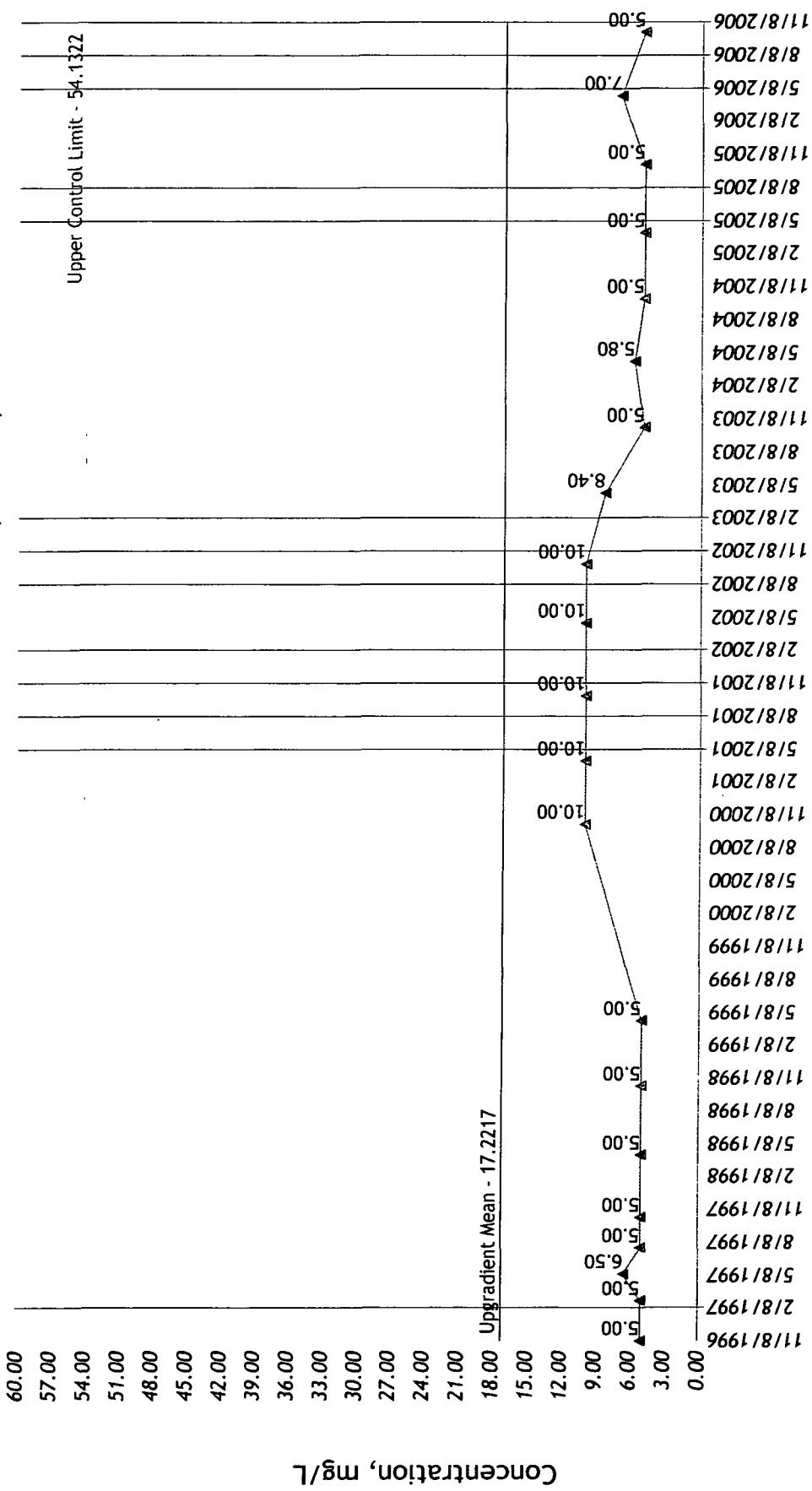
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### Total Phenols Trends - (MW-9)



### Chemical Oxygen Demand Trends - (MW-10)

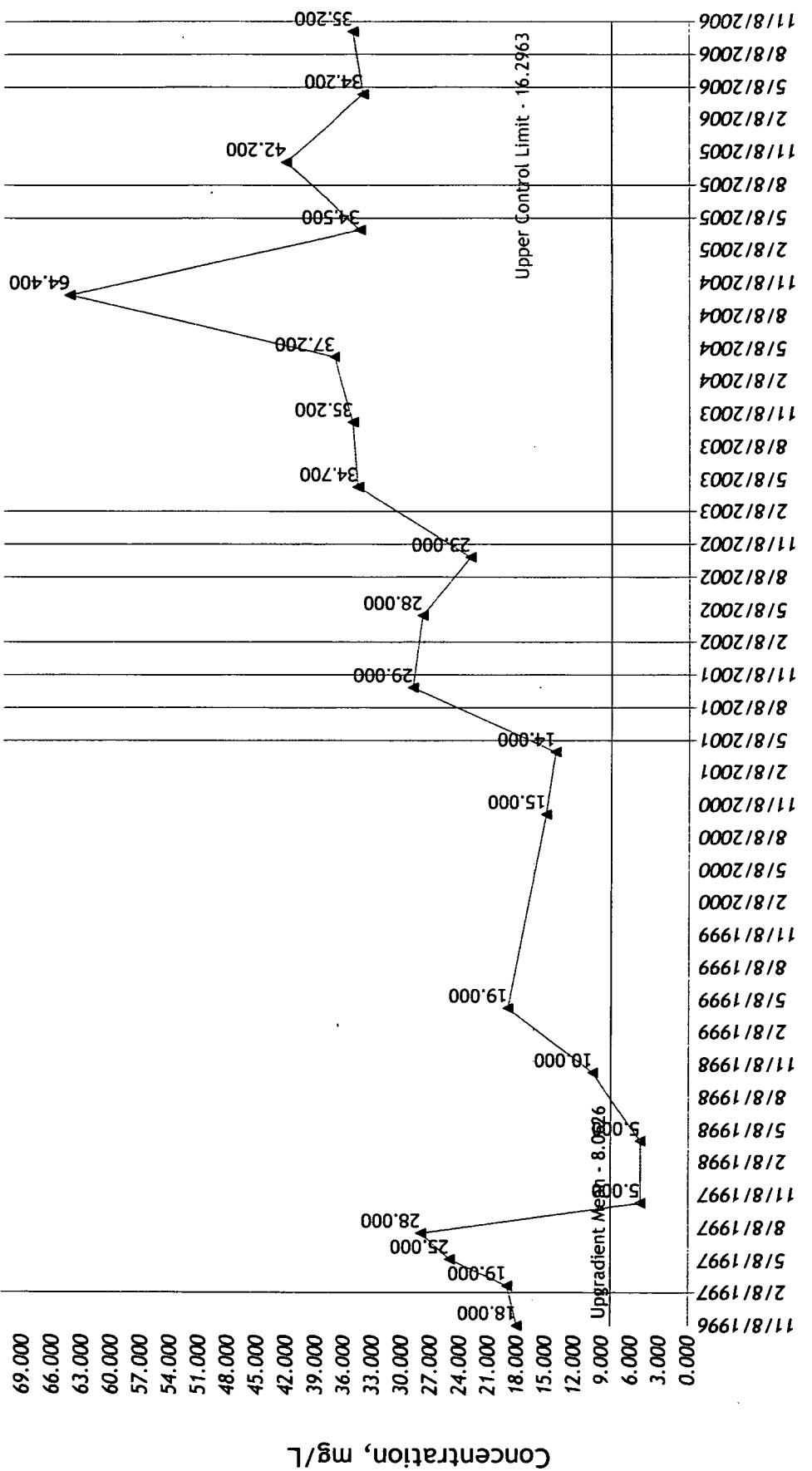


9

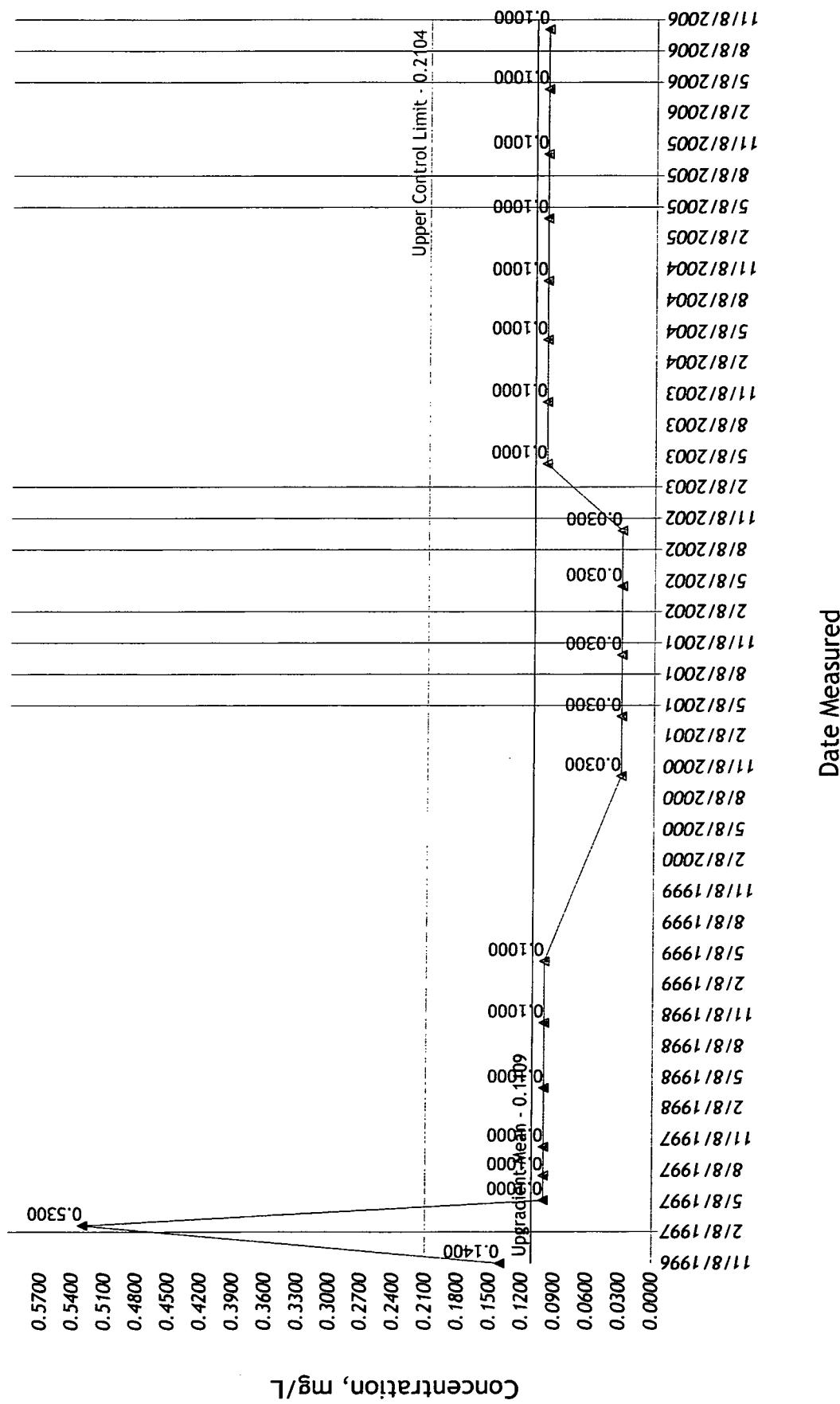
**Chemical Oxygen Demand  
Council Bluffs Construction and Demolition Landfill**  
78-SDP-04-89

06001  
11/9/2006 4:45:23 PM

## Chloride Trends - (MW-10)



### Iron, Dissolved Trends - (MW-10)



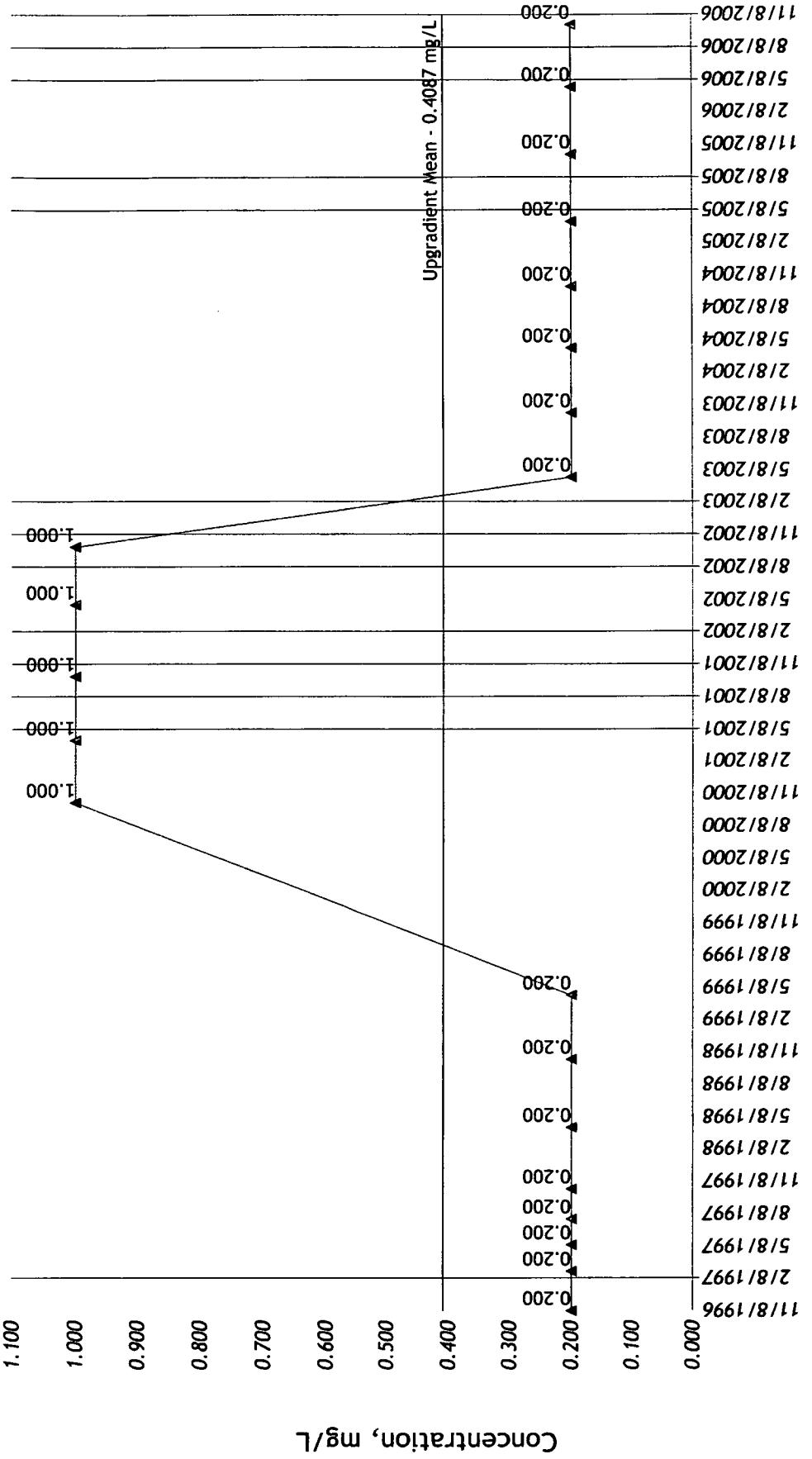
11

Iron, Dissolved  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

Iron, Dissolved

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11/9/2006 4:45:23 PM

### Nitrogen, Ammonia Trends - (MW-10)

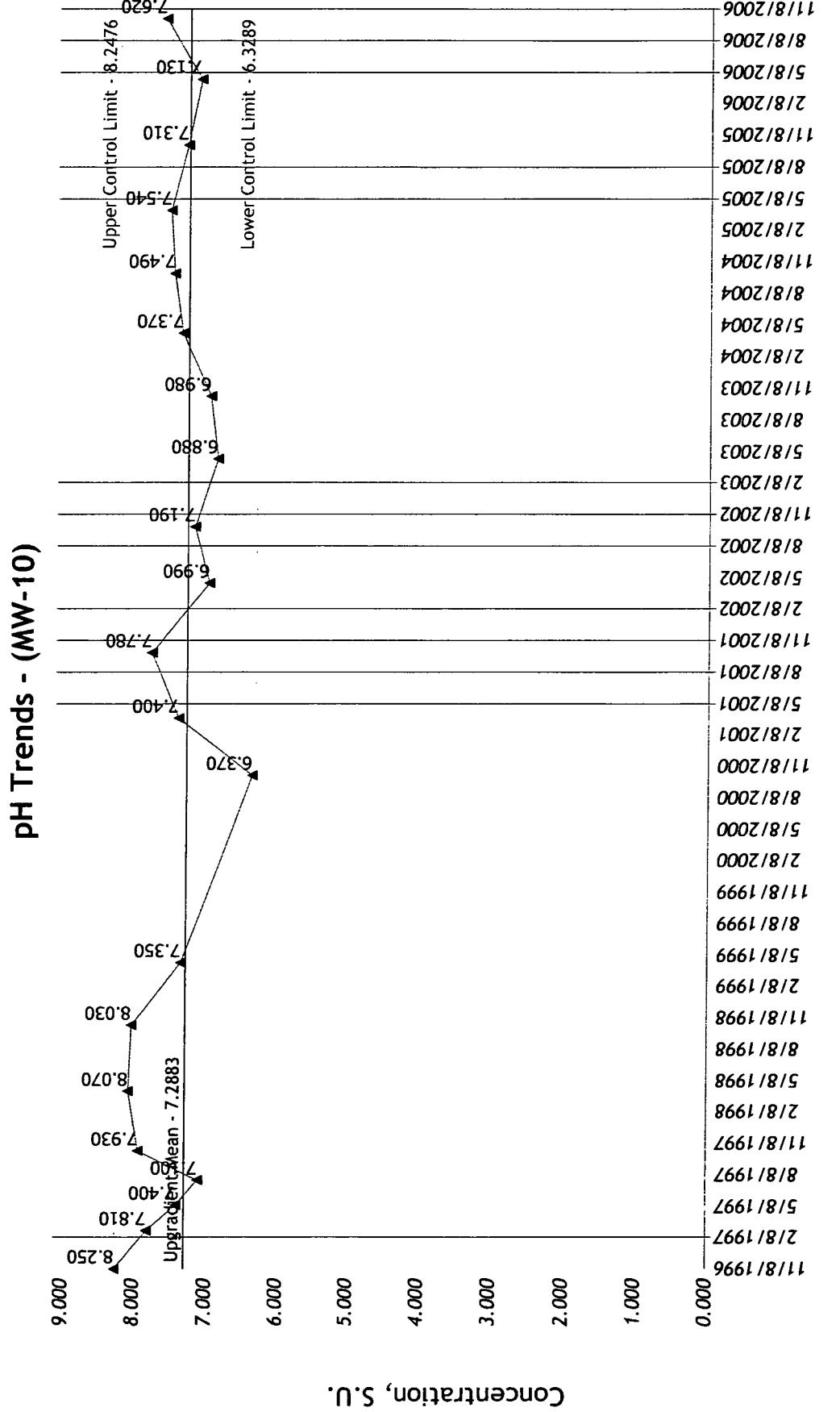


Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

12

Nitrogen, Ammonia  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

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11/9/2006 4:45:23 PM

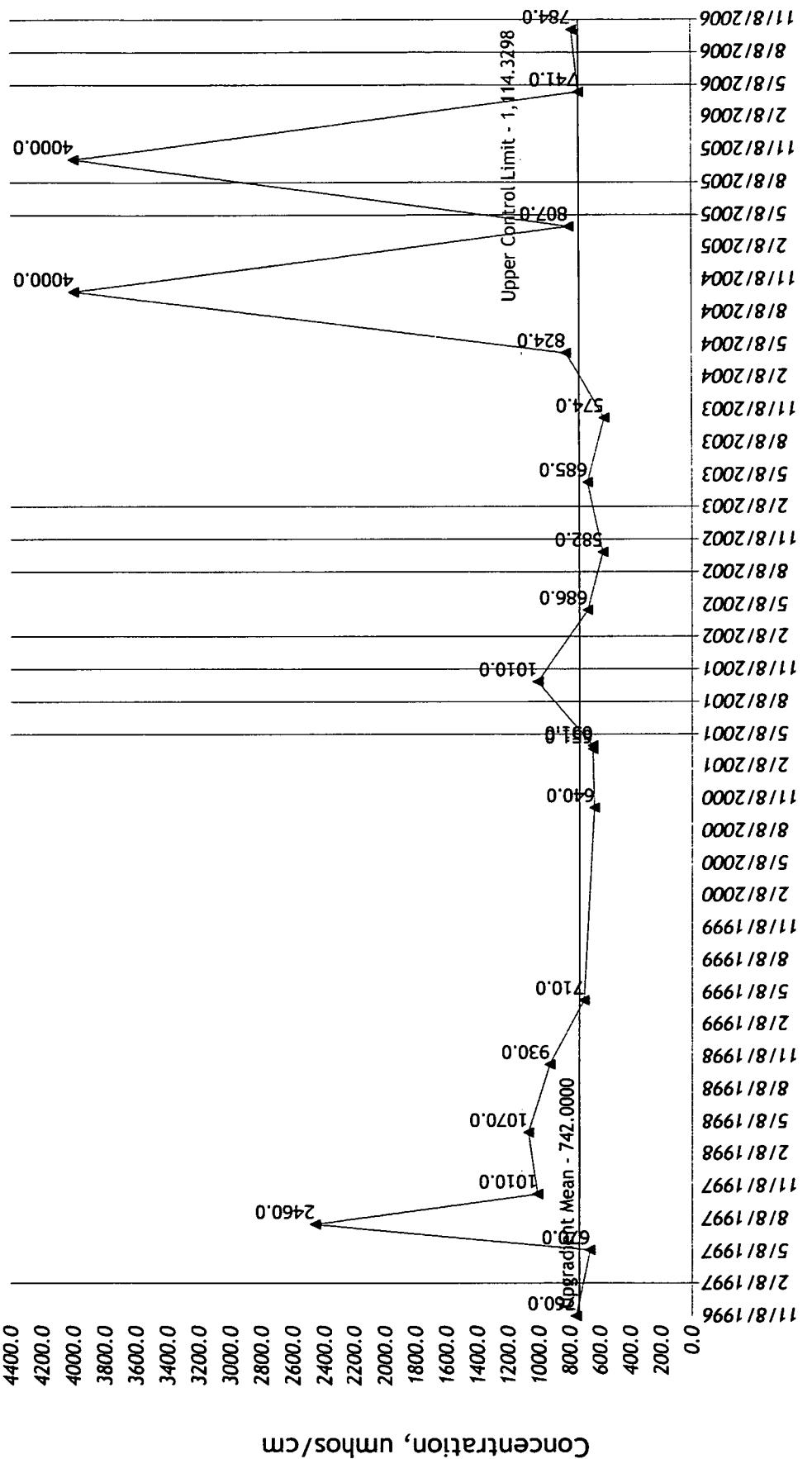


**13**

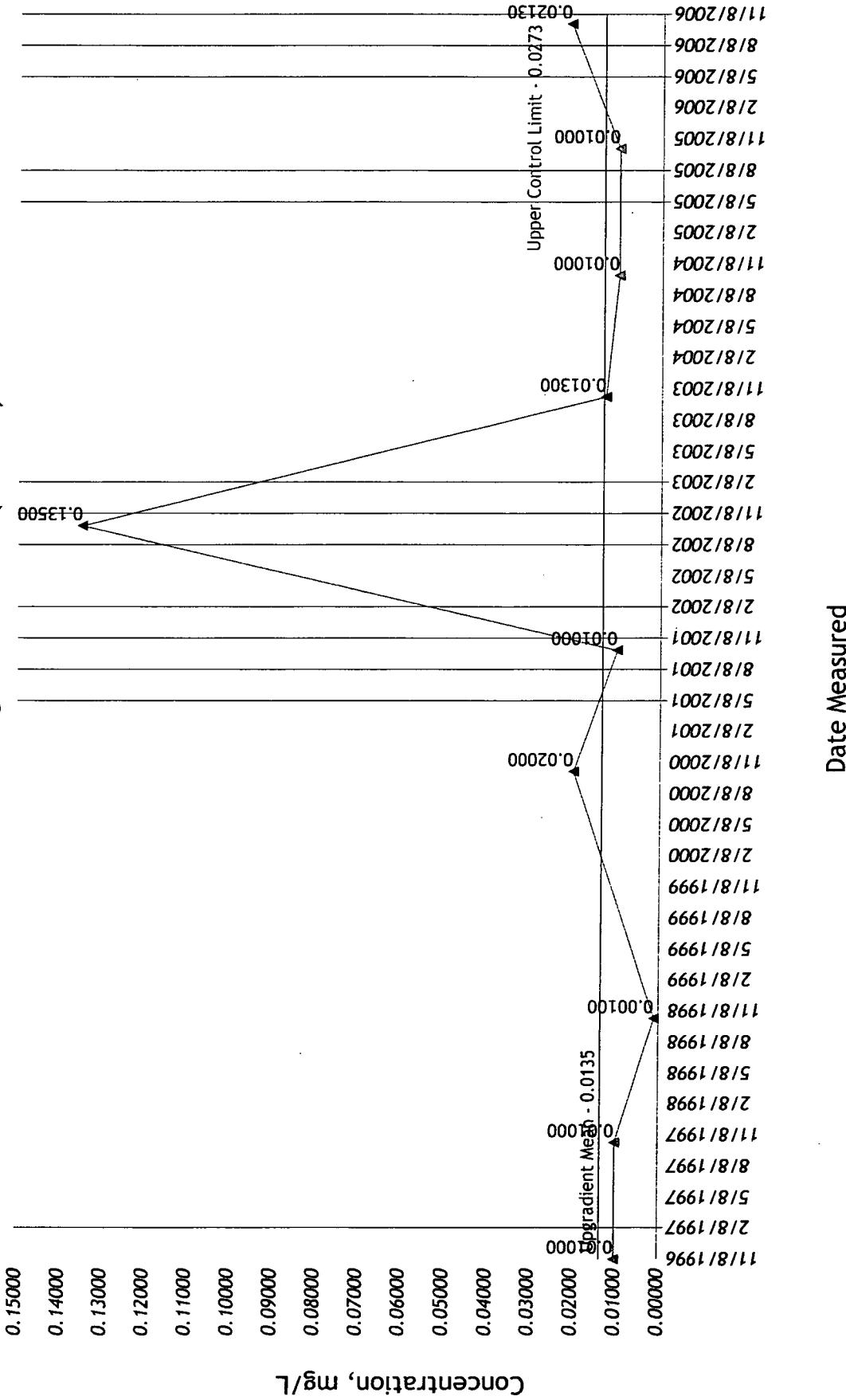
**pH**  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

06001  
11/9/2006 4:45:23 PM

### Specific Conductance Trends - (MW-10)



### Total Organic Halogens Trends - (MW-10)

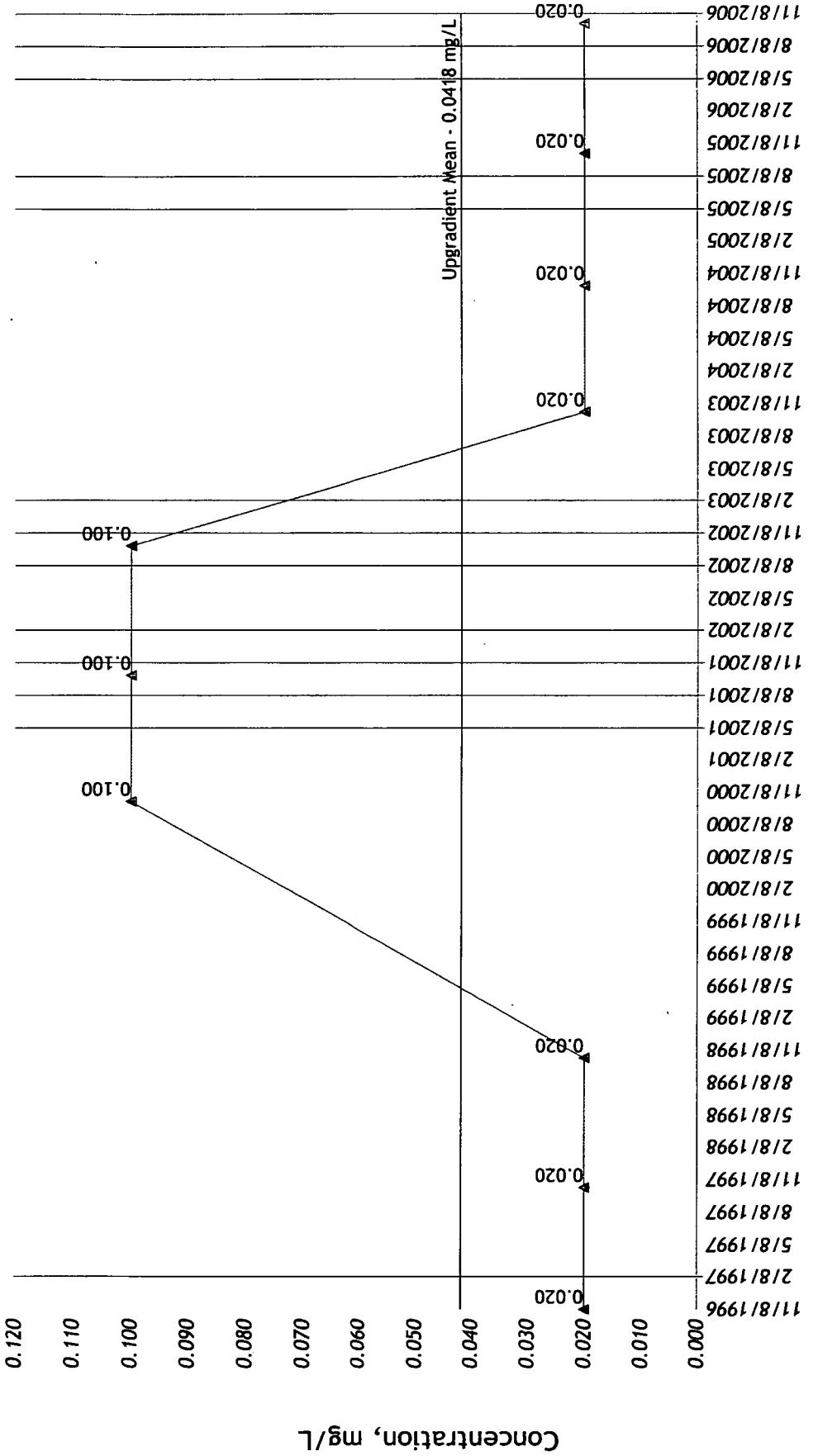


15

**Total Organic Halogens**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-04-89

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11/9/2006 4:45:23 PM

### Total Phenols Trends - (MW-10)



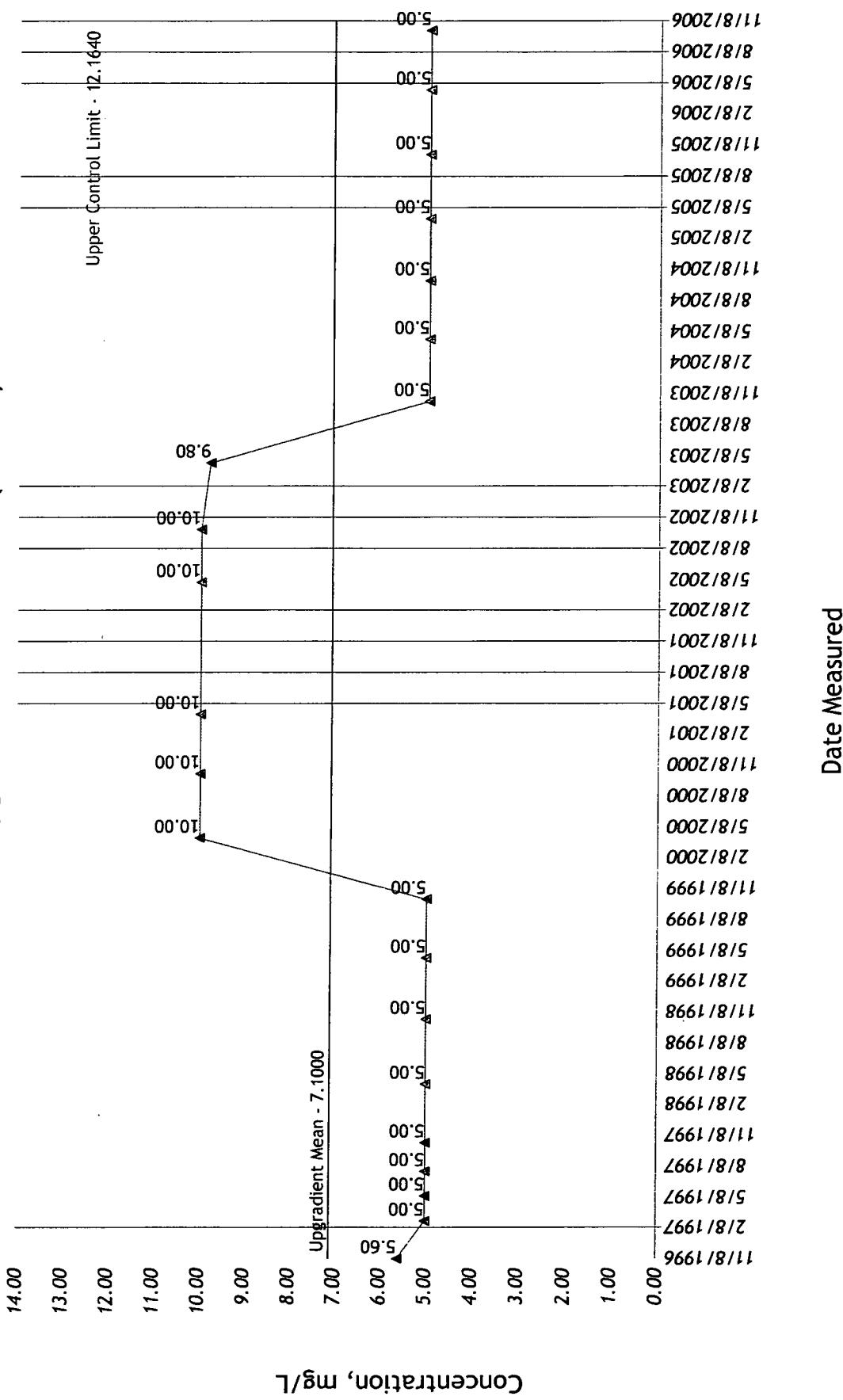
Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

**16**

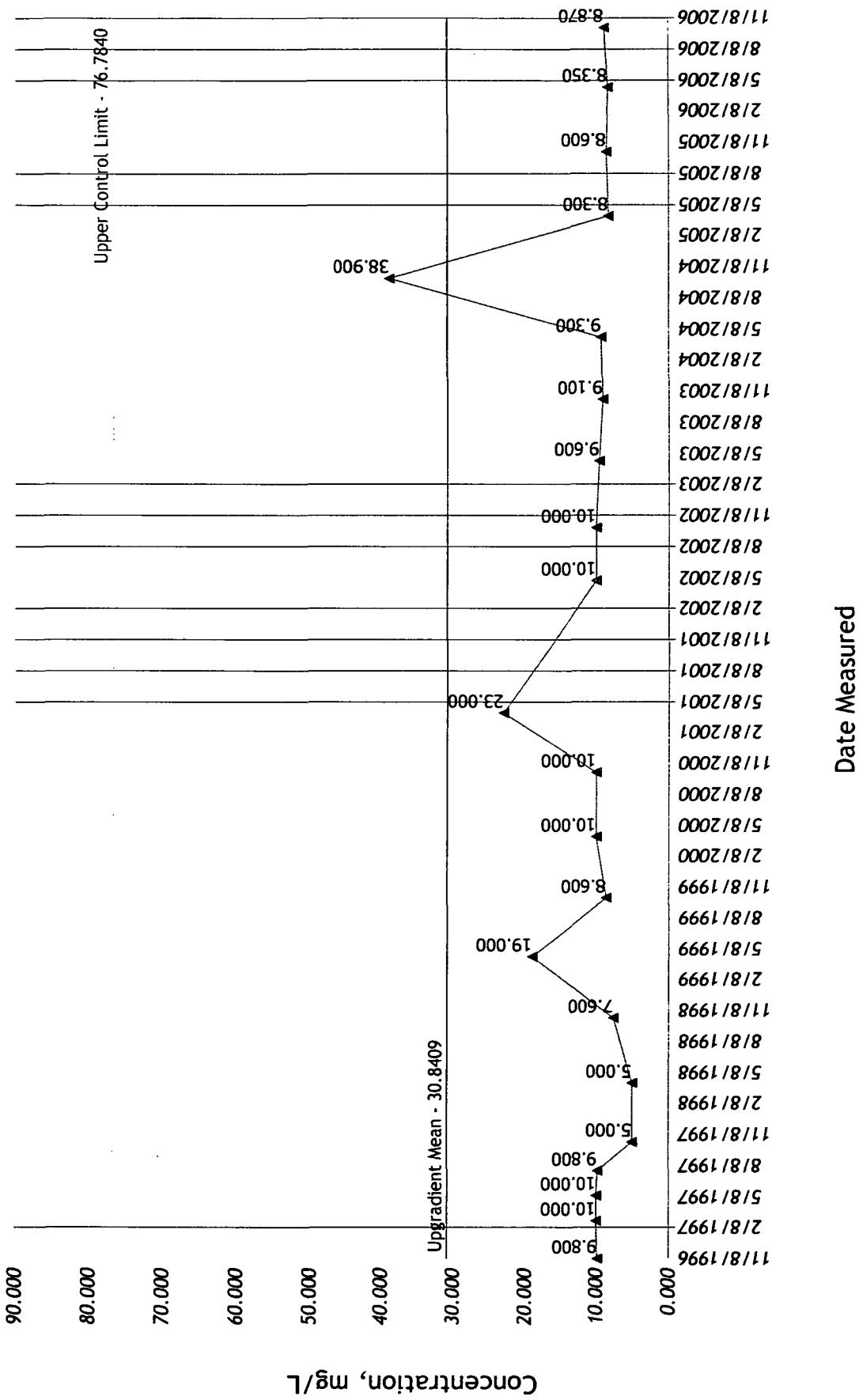
**Total Phenols**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-04-89

06001  
11/9/2006 4:45:23 PM

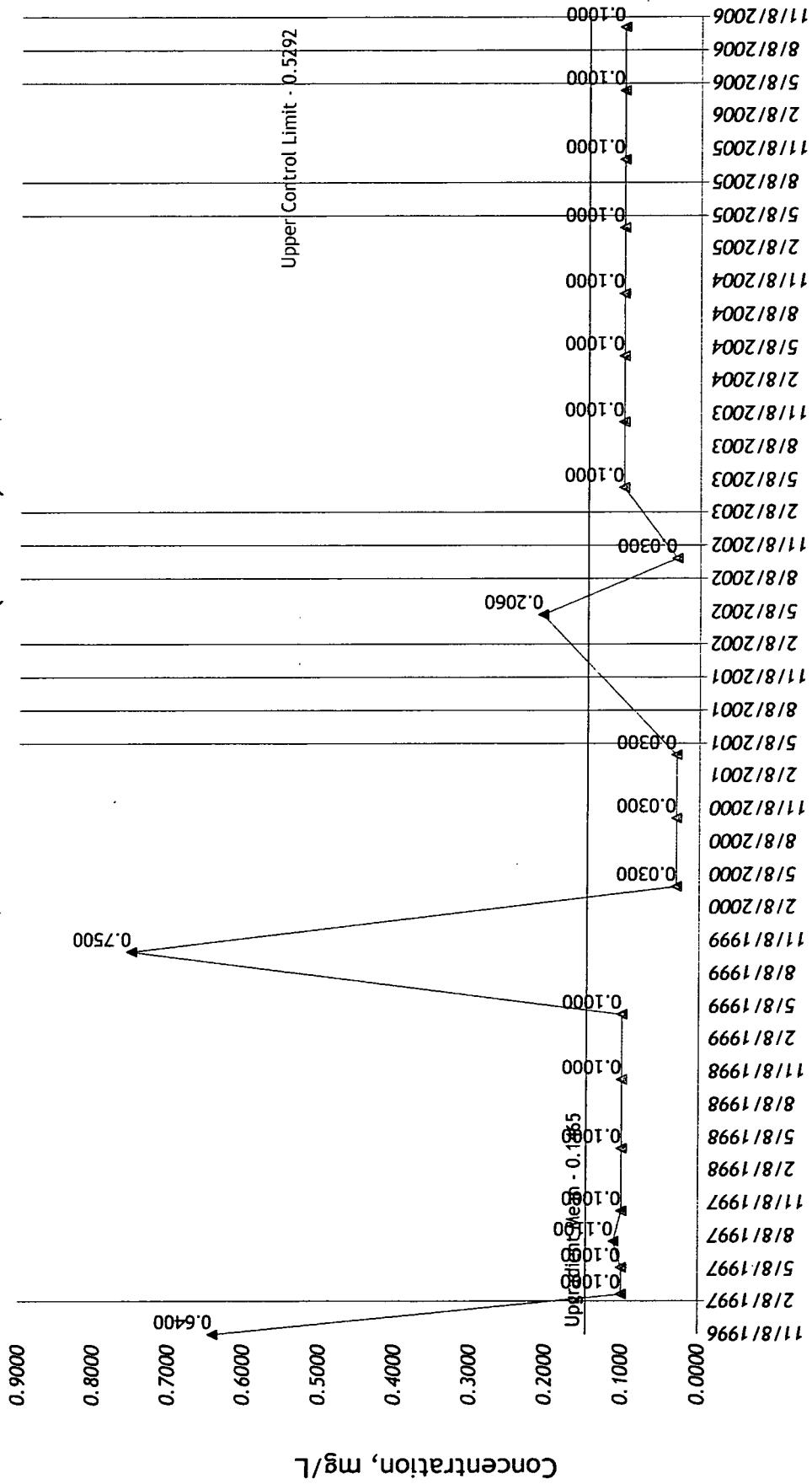
### Chemical Oxygen Demand Trends - (MW-11)



### Chloride Trends - (MW-11)



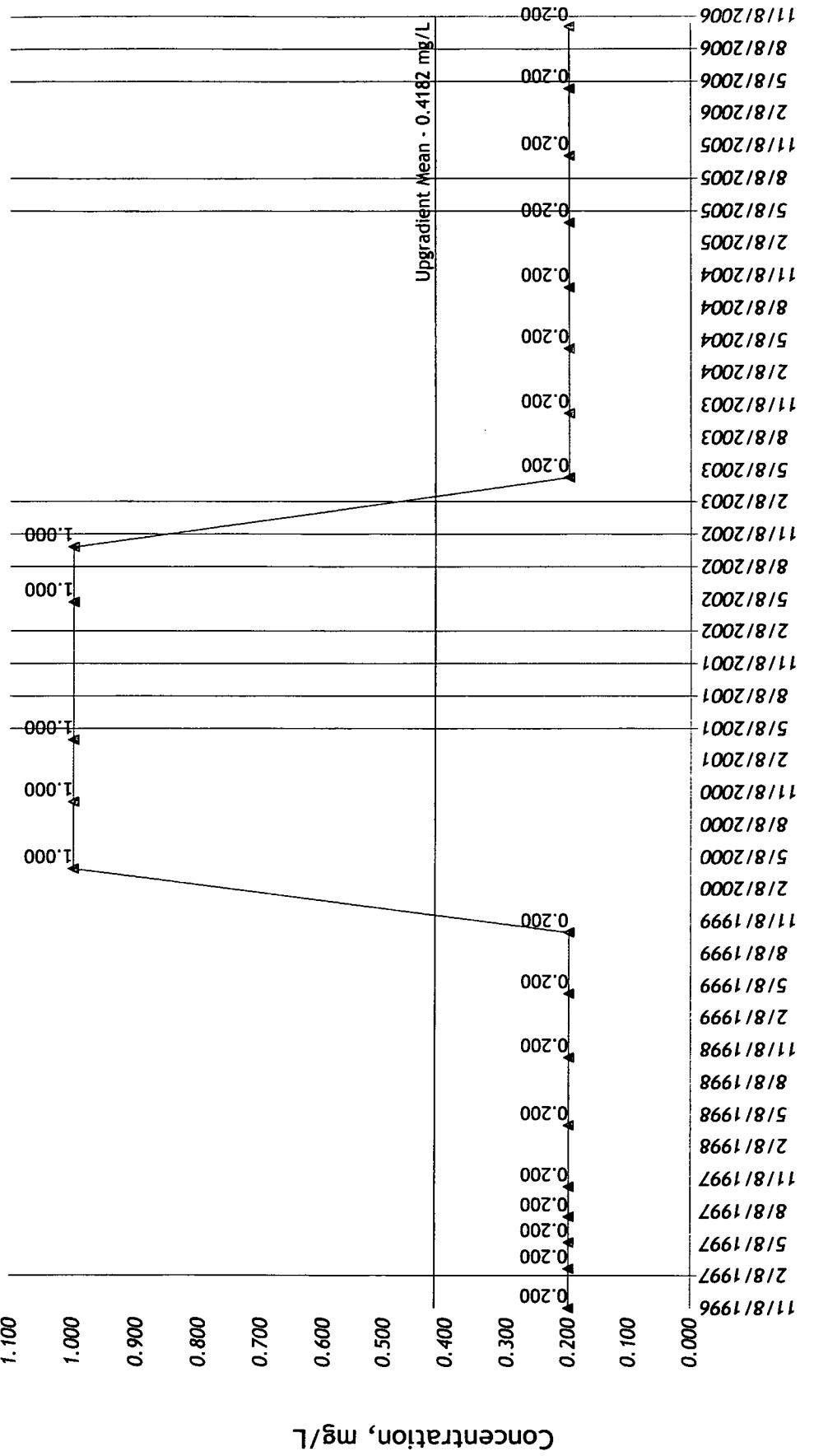
### Iron, Dissolved Trends - (MW-11)



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Iron, Dissolved  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

### Nitrogen, Ammonia Trends - (MW-11)

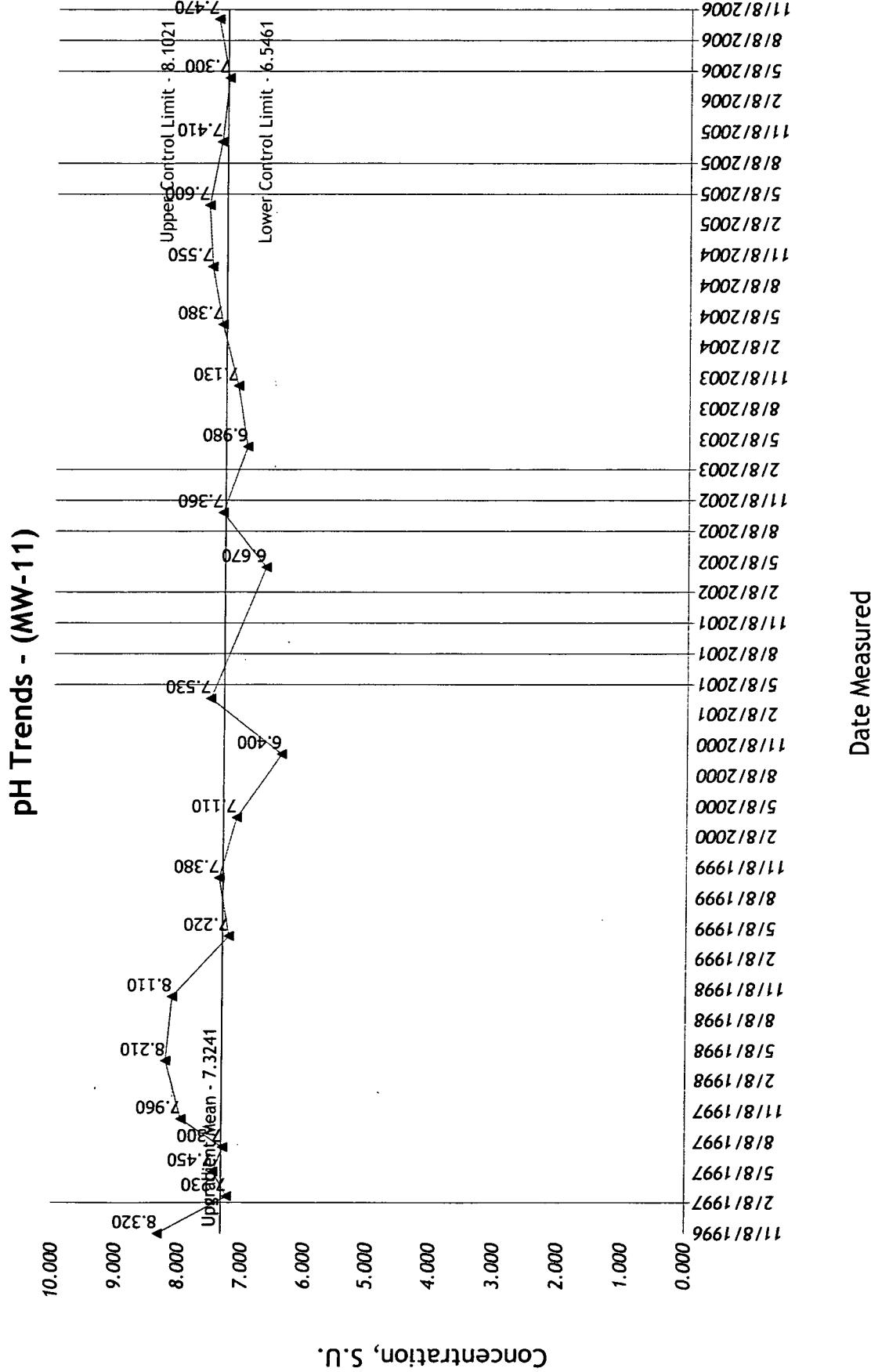


Note: The upper control limit is not shown as the standard deviation was not calculated due to consistent parameter non-detect in the up-gradient monitoring point.

20

Nitrogen, Ammonia  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89

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11/9/2006 4:45:24 PM

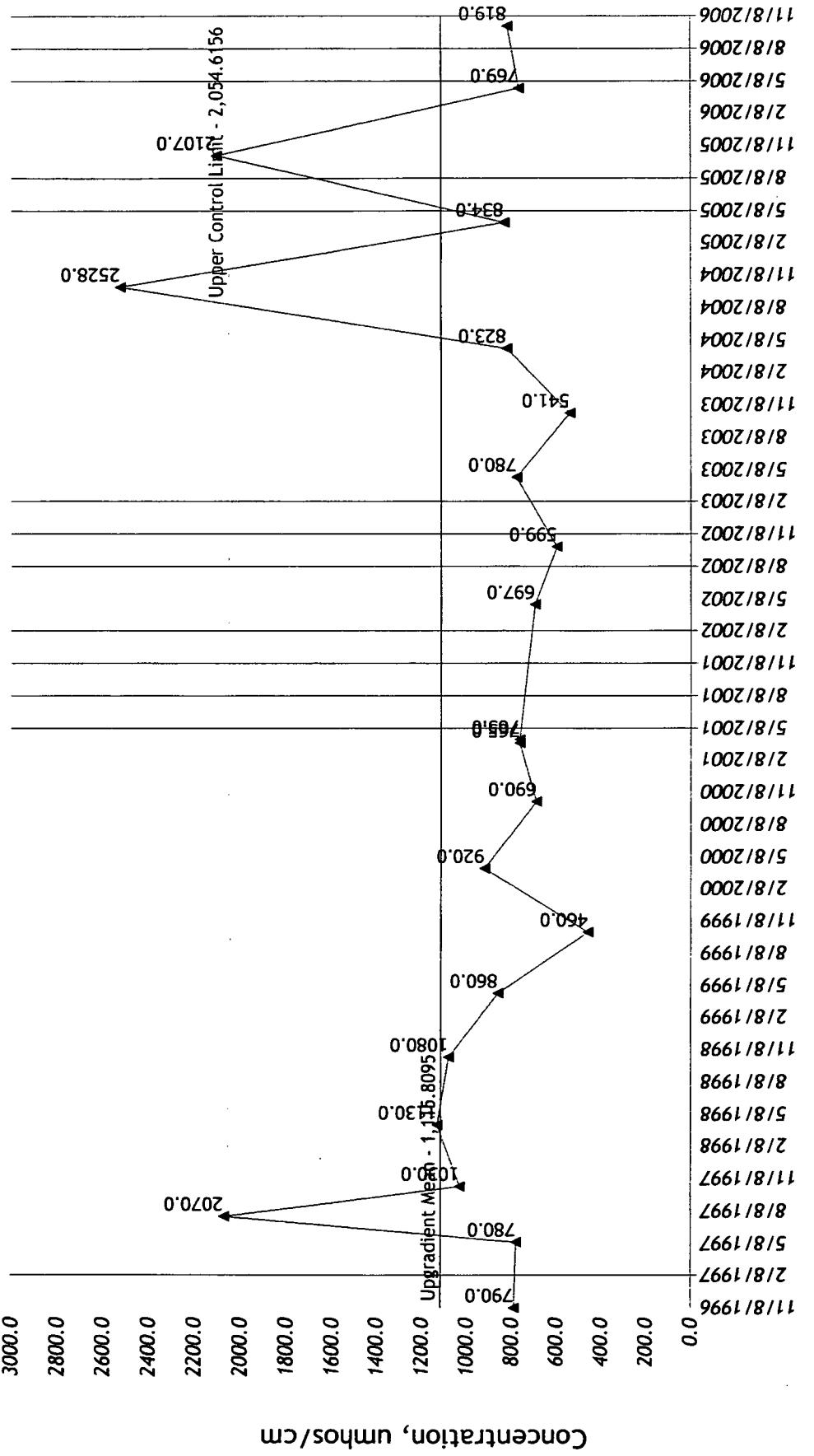


**21**

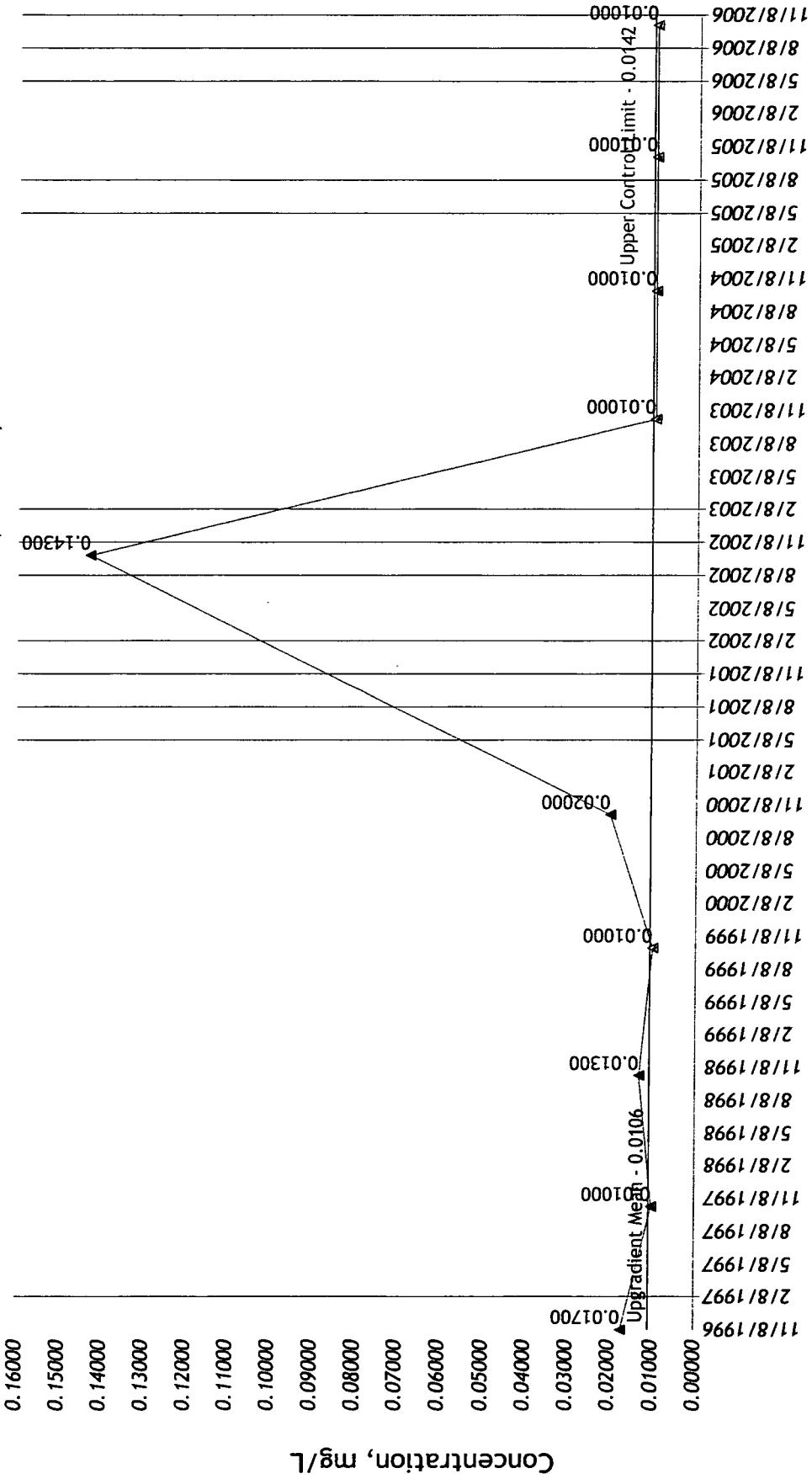
**pH**  
**Council Bluffs Construction and Demolition Landfill**  
78-SDP-04-89

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11/9/2006 4:45:24 PM

### Specific Conductance Trends - (MW-11)



### Total Organic Halogens Trends - (MW-11)



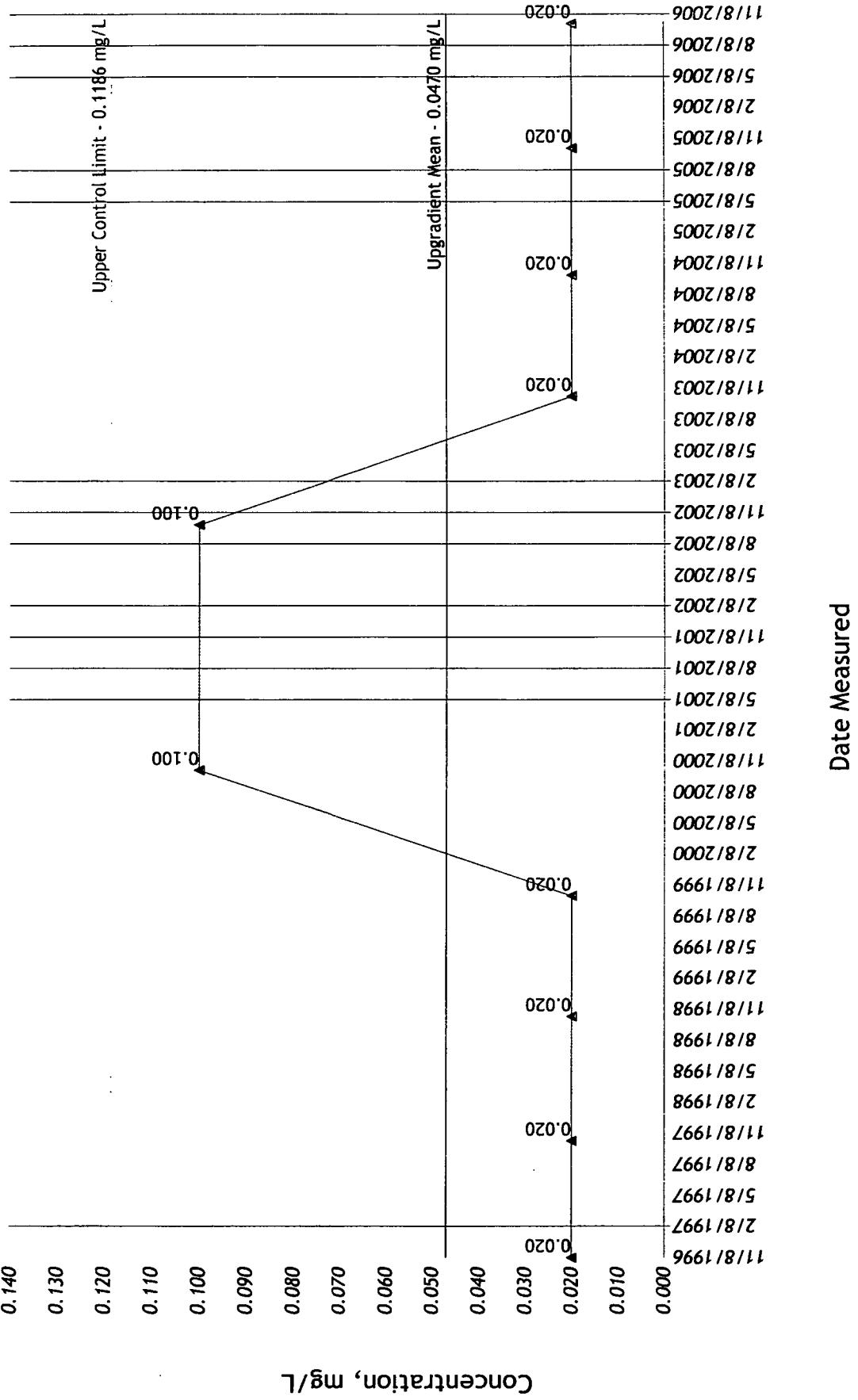
**23**

**Total Organic Halogens  
Council Bluffs Construction and Demolition Landfill  
78-SDP-04-89**

**Total Organic Halogens  
Council Bluffs Construction and Demolition Landfill**

**06001  
11/9/2006 4:45:24 PM**

### Total Phenols Trends - (MW-11)



**APPENDIX F**  
**LEACHATE CONTROL SYSTEM MONITORING SHEET**

**2006**

**Leachate Control System Monitoring Sheet**  
**Anderson Excavating C&D Landfill**  
**Permit # 78-SDP-04-89P**

Leachate Tank Monitoring Date	Leachate Pump Level (% Full)	Leachate Tank Pumping Date	Method of Leachate Treatment (Recirculation or POTW)
January	75%	1-5-06	Recirculation
February	17%		
March	28%		
April	90%	4-12-06	Recirculation
May	25%		
June	40%		
July	55%	7-15-06	Recirculation
August	15%		
September	40%		
October	65%		
November	85%	10-4-06	Recirculation
December			

\* POTW (Publicly Owned Treatment Works) – Refer to permit for requirements